PROOF OF THE CONTINUED FRACTION CONJECTURE FOR $(a,b)=(z^3+1,z^4+z^3+z^2+1)$

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Abstract. The continued fraction conjecture claims that the continued fraction defined by the (a,b)-Thue-Morse sequence is algebraic over $\mathbb{F}_2(x)$ for all pairs of distinct elements (a,b) in $\mathbb{F}_2[x]\setminus\mathbb{F}_2$. In this paper we prove the conjecture for $(a,b)=(z^3+1,z^4+z^3+z^2+1)$.

1. Introduction

Let $\mathbb{F}_2$ be the finite field of cardinality 2. Given a sequence of polynomials $\mathbf{a}=(a_0(z),a_1(z),a_2(z),\ldots)$ of elements from $\mathbb{F}_2[z]\setminus\mathbb{F}_2$, we define the infinite continued fraction

$$\mathrm{CF}(\mathbf{a}(z))=\cfrac{1}{a_0(z)+\cfrac{1}{a_1(z)+\cfrac{1}{a_2(z)+\cfrac{1}{\ddots}}}} \tag{1.1}$$

as the limit of the finite continued fractions

$$\mathrm{CF}_n(\mathbf{a}(z))=\cfrac{1}{a_0(z)+\cfrac{1}{a_1(z)+\cfrac{1}{\ddots+\cfrac{1}{a_n(z)}}}}\in\mathbb{F}_2((1/z)). \tag{1.2}$$

Conversely, each power series in $\mathbb{F}_2[[1/z]]$ without constant term

$$c_{-1}z^{-1}+c_{-2}z^{-2}+c_{-3}z^{-3}+\cdots \tag{1.3}$$

admits a continued fraction expansion of form (1.1).

Let a and b be two distinct elements from $\mathbb{F}_2[z]\setminus\mathbb{F}_2$. We consider the continued fraction (1.1) associated with the (a,b)-Thue-Morse sequence

$$\mathbf{t}=(t_0(z),t_1(z),t_2(z),\ldots)=(a,b,b,a,b,a,a,b,\ldots)$$

that we shall denote

$$\mathrm{CF}(a,b):=\mathrm{CF}(\mathbf{t}). \tag{1.4}$$

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Theorem 1.1. *When* $(a,b)=(z^3+1, z^4+z^3+z^2+1)$*, the two power series* $\mathrm{CF}(a,b)$ *and* $\mathrm{CF}(b,a)$ *are algebraic over* $\mathbb{F}_2(z)$*, with minimal polynomials of the form*

$$p_4(z)y^4+p_3(z)y^3+p_2(z)y^2+p_1(z)y+p_0(z)=0$$

where, for $\mathrm{CF}(a,b)$*,*

$$\begin{aligned}
p_0(z)&=z^{15}+z^{14}+z^{13}+z^{12}+z^9+z^6+z^5+z^4+1,\\
p_1(z)&=z^{19}+z^{18}+z^{15}+z^{13}+z^{12}+z^{11}+z^9+z^7+z^4+z^2,\\
p_2(z)&=z^{22}+z^{20}+z^{18}+z^{12}+z^6+z^4+z^2+1,\\
p_3(z)&=z^{19}+z^{18}+z^{15}+z^{13}+z^{12}+z^{11}+z^9+z^7+z^4+z^2,\\
p_4(z)&=z^{16}+z^{15}+z^{14}+z^{13}+z^{10}+z^9+z^8+z^5+1,
\end{aligned}$$

and for $\mathrm{CF}(b,a)$*,*

$$\begin{aligned}
p_0(z)&=z^{15}+z^{14}+z^{13}+z^{12}+z^{10}+z^9+z^8+z^6+z^5+z^4+1,\\
p_1(z)&=z^{19}+z^{18}+z^{15}+z^{13}+z^{12}+z^{11}+z^9+z^7+z^4+z^2,\\
p_2(z)&=z^{22}+z^{20}+z^{18}+z^{12}+z^6+z^4+z^2+1,\\
p_3(z)&=z^{19}+z^{18}+z^{15}+z^{13}+z^{12}+z^{11}+z^9+z^7+z^4+z^2,\\
p_4(z)&=z^{16}+z^{15}+z^{14}+z^{13}+z^9+z^5+1.
\end{aligned}$$

2. Proof

Define the sequences of polynomials $(P_n(z))_{n\geq 0}$ and $(Q_n(z))_{n\geq 0}$ by

$$\begin{pmatrix} P_n(z) & Q_n(z)\\ P_{n-1}(z) & Q_{n-1}(z)\end{pmatrix} := \begin{pmatrix} t_n(z) & 1\\ 1 & 0\end{pmatrix}\begin{pmatrix} t_{n-1}(z) & 1\\ 1 & 0\end{pmatrix}\cdots\begin{pmatrix} t_0(z) & 1\\ 1 & 0\end{pmatrix}\begin{pmatrix} 0 & 1\\ 1 & 0\end{pmatrix}.$$

By the basic properties of continued fractions, we have

$$\mathrm{CF}_n(a,b)=\frac{P_n(z)}{Q_n(z)}\in\mathbb{F}_2((1/z)). \tag{2.1}$$

As formula (2.1) is not efficient for calculating $\mathrm{CF}_n(a,b)$, a fast method is to be derived and described as follows. Define

$$\begin{aligned}
M_n(x)&=x^{\deg(t_{2^n-1})}\begin{pmatrix} t_{2^n-1}(1/x) & 1\\ 1 & 0\end{pmatrix}\times x^{\deg(t_{2^n-2})}\begin{pmatrix} t_{2^n-2}(1/x) & 1\\ 1 & 0\end{pmatrix}\times\\
&\qquad\cdots\times x^{\deg(t_0)}\begin{pmatrix} t_0(1/x) & 1\\ 1 & 0\end{pmatrix},\\
W_n(x)&=x^{\deg(\bar t_{2^n-1})}\begin{pmatrix} \bar t_{2^n-1}(1/x) & 1\\ 1 & 0\end{pmatrix}\times x^{\deg(\bar t_{2^n-2})}\begin{pmatrix} \bar t_{2^n-2}(1/x) & 1\\ 1 & 0\end{pmatrix}\times\\
&\qquad\cdots\times x^{\deg(\bar t_0)}\begin{pmatrix} \bar t_0(1/x) & 1\\ 1 & 0\end{pmatrix},
\end{aligned}$$

where $\bar{\mathbf{t}}$ is the (b,a)-Thue-Morse sequence. By the properties of the Thue-Morse sequence, we have for $n\geq 0$

$$\begin{aligned}
M_{n+1}(x)&=W_n(x)\cdot M_n(x),\\
W_{n+1}(x)&=M_n(x)\cdot W_n(x).
\end{aligned}$$

Let $x := 1/z$. For each non-zero polynomial $P(z)$, define $\tilde{P}(x)$ to be $P(1/x)$. Then,

$$\mathrm{CF}_n(a,b) = \frac{P_n(z)}{Q_n(z)} = \frac{\tilde{P}_n(x)}{\tilde{Q}_n(x)} \in \mathbb{F}_2((x)) = \mathbb{F}_2((1/z)).$$

Comparing the definition of $M_n(x)$ with the definition of $P_n(x)$ and $Q_n(x)$, we see that

$$M_n(x)_{0,1} = x^{d_n}\tilde{P}_{2^n-1}(x),$$
$$M_n(x)_{0,0} = x^{d_n}\tilde{Q}_{2^n-1}(x),$$

for some positive integer d_n. Hence,

$$\mathrm{CF}_{2^{2n}-1}(a,b) = \frac{\tilde{P}_{2^{2n}-1}(x)}{\tilde{Q}_{2^{2n}-1}(x)} = \frac{M_{2n}(x)_{0,1}}{M_{2n}(x)_{0,0}}. \tag{2.2}$$

Therefore, by the convergence theorem of continued fraction, the algebraicity of $\mathrm{CF}(a,b)$ will be established if it is shown that both $M_{2n}(x)_{0,1}$ and $M_{2n}(x)_{0,0}$ converge to algebraic series in $\mathbb{F}_2[[x]]$.

Actually, we will prove that for all $0 \le i,j \le 1$ the four sequences $(M_{2n}(x)_{i,j})_n$, $(M_{2n+1}(x)_{i,j})_n$, $(W_{2n}(x)_{i,j})_n$, and $(W_{2n+1}(x)_{i,j})_n$ converge to algebraic series in $\mathbb{F}_2[[x]]$. For this purpose, we define four 2×2 matrices M^e, M^o, W^e, W^o as follows: For each $T \in \{M^e, M^o, W^e, W^o\}$ and $0 \le i,j \le 1$, $T_{i,j}$ is defined to be the unique solution in $\mathbb{F}_2[[x]]$ of the polynomial $\phi(T,i,j)$ under certain initial conditions; the polynomials $\phi(T,i,j)$ and initial conditions are given in Section 3. We will prove that these four matrices, whose components are algebraic by definition, are the limits of $(M_{2n}(x))_n$, $(M_{2n+1}(x))_n$, $(W_{2n}(x))_n$, and $(W_{2n+1}(x))_n$.

Let us explain how the polynomials $\phi(T,i,j)$ and initial conditions are found, and why the solutions exist and are unique. For $0 \le i,j \le 1$, the the coefficients of the polynomial $\phi(M^e,i,j)$ (resp. $\phi(M^o,i,j)$, $\phi(W^e,i,j)$, and $\phi(W^o,i,j)$) are the Padé-Hermite approximants of type

$$(175, 175, 175, 175, 175)$$

of the vector

$$(1, T^3, T^6, T^9, T^{12}),$$

where $T = M_{12,i,j}$ (resp. $M_{11,i,j}$, $W_{12,i,j}$, and $W_{11,i,j}$), found by the Derksen algorithm. We take the first 8 terms of $M_{12,i,j}$ (resp. $M_{11,i,j}$, $W_{12,i,j}$, and $W_{11,i,j}$) as initial conditions for $\phi(M^e,i,j)$ (resp. $\phi(M^o,i,j)$, $\phi(W^e,i,j)$, and $\phi(W^o,i,j)$). The following fact will be used to ensure that the solution exists and is unique: let $P(x,y) \in \mathbb{F}_2[x,y]$ and for each series $f(x) = \sum_{n=0}^{\infty} a_n x^n \in \mathbb{F}_2[[x]]$ denote the partial sum $\sum_{j=0}^{n-1} a_j x^j$ by $f_n(x)$ for $n \ge 0$. If for some $n \ge 0$ and $a_0, a_1, \ldots, a_{n-1} \in \mathbb{F}_2$ $P(x, \sum_{j=0}^{n-1} a_j x^j) = O(x^n)$ and $Q(x,y) := P(x, \sum_{j=0}^{n-1} a_j x^j + x^n y)$ can be written as $x^m \sum_{j=0}^{\infty} q_j(x) y^j$ where $q_j(x)$ are polynomials for $j \ge 0$, $q_1(0) = 1$, and $q_j(0) = 0$ for $j > 1$, then there exists a unique solution $f(x) \in \mathbb{F}_2[[x]]$ of $P(x, f(x)) = 0$ that satisfies the initial condition $f_n(x) = \sum_{j=0}^{n-1} a_j x^j$.

We state two lemmas concerning the four matrices M^e, M^o, W^e, W^o. The first one is about relations between them; the second, about the structure of the each matrix.

Lemma 2.1. *We have*

$$M^e = W^o \cdot M^o, \tag{2.3}$$

$$M^o = W^e \cdot M^e, \tag{2.4}$$

$$W^e = M^o \cdot W^o, \tag{2.5}$$

$$W^o = M^e \cdot W^e. \tag{2.6}$$

Proof. We give the proof of the identity

$$M^e_{0,0} = W^o_{0,0} M^o_{0,0} + W^o_{0,1} M^o_{1,0},$$

the proofs of the others being similar.

First, we compute the minimal polynomials of $W^o_{0,0} M^o_{0,0}$ and $W^o_{0,1} M^o_{1,0}$. We know that

$$P(x,y) = \mathrm{Res}_z \left(\phi(W^o,0,0)(x,z),\ z^{12} \cdot \phi(M^o,0,0)(x,y/z)\right)$$

is an annihilating polynomial of $W^o_{0,0} M^o_{0,0}$. We use Padé-Hermite approximation to find a candidate for the minimal polynomial of $W^o_{0,0} M^o_{0,0}$, that will be called $\phi_0(x,y)$. To prove that $\phi_0(x,y)$ is indeed the minimal polynomial, it suffices to prove that it is an irreducible factor of $P(x,y)$ of multiplicity m and that $Q(x,y) := P(x,y)/\phi_0(x,y)^m$ is not an annihilating polynomial of $W^o_{0,0} M^o_{0,0}$. We verify the first point directly. For the second point, we truncate $W^o_{0,0} M^o_{0,0}$ to order 630 and substitute it for y in $Q(x,y)$. We get a series of valuation less than 630, which proves that $Q(x,y)$ is not an annihilating polynomial of $W^o_{0,0} M^o_{0,0}$. We find the minimal polynomial $\phi_1(x,y)$ of $W^o_{0,1} M^o_{1,0}$ in a similar way.

Now we prove that $\phi(M^e,0,0)$ is the minimal polynomial of $W^o_{0,0} M^o_{0,0} + W^o_{0,1} M^o_{1,0}$. We know that

$$S(x,y) = \mathrm{Res}_z \left(\phi_0(x,z),\ \phi_1(x,y+z)\right)$$

is an annihilating of $W^o_{0,0} M^o_{0,0} + W^o_{0,1} M^o_{1,0}$. We verify that $\phi(M^e,0,0)$ is an irreducible factor of $S(x,y)$ of multiplicity μ, and that $Q(x,y) := S(x,y)/\phi(M^e,0,0)^\mu$ is not an annihilating polynomial of $W^o_{0,0} M^o_{0,0} + W^o_{0,1} M^o_{1,0}$. To see the last point, we truncate $W^o_{0,0} M^o_{0,0} + W^o_{0,1} M^o_{1,0}$ to order 770 and substitute it for y in $Q(x,y)$. We get a series of valuation less than 770, and therefore $Q(x,y)$ is not an annihilating polynomial of $W^o_{0,0} M^o_{0,0} + W^o_{0,1} M^o_{1,0}$.

Finally, the first 16 terms of $M^e_{0,0}$ and $W^o_{0,0} M^o_{0,0} + W^o_{0,1} M^o_{1,0}$ coincide. As these first terms determine a unique solution of $\phi(M^e,0,0)$, we know that the two series are one and the same. □

Define

$$R^e = \begin{pmatrix} 1 & 1 \\ 1 & 0 \end{pmatrix} \qquad \text{and} \qquad R^o = \begin{pmatrix} 0 & 1 \\ 1 & 1 \end{pmatrix}.$$

Lemma 2.2. *For all integers $k \geq 2$ and $u = 2^{2k-1}$, the following identities hold.*

$$\begin{aligned} M^e[:14u] = {} & M^e[:7u] + x^u M^e[:6u] + x^{2u} M^e[:5u] + x^{3u} M^e[:4u] + x^{5u} M^e[:2u] \\ & + x^{6u} M^e[:u] + x^u M^e[:7u] + x^{2u} M^e[:6u] + x^{3u} M^e[:5u] \\ & + x^{4u} M^e[:4u] + x^{6u} M^e[:2u] + x^{7u} M^e[:u] + x^{4u} M^e[:7u] \\ & + x^{5u} M^e[:6u] + x^{6u} M^e[:5u] + x^{7u} M^e[:4u] + x^{9u} M^e[:2u] \\ & + x^{10u} M^e[:u] + x^{6u} M^e[:7u] + x^{7u} M^e[:6u] + x^{8u} M^e[:5u] \\ & + x^{9u} M^e[:4u] + x^{11u} M^e[:2u] + x^{12u} M^e[:u] + x^{7u} M^e[:7u] \end{aligned}$$

$$
\begin{aligned}
&+ x^{8u}M^e[:6u] + x^{10u}M^e[:4u] + x^{12u}M^e[:2u] \\
&+ (x^{7u} + x^{8u} + x^{11u} + x^{13u})R^e, \\
W^e[:14u] = {}& W^e[:7u] + x^uW^e[:6u] + x^{2u}W^e[:5u] + x^{3u}W^e[:4u] + x^{5u}W^e[:2u] \\
&+ x^{6u}W^e[:u] + x^uW^e[:7u] + x^{2u}W^e[:6u] + x^{3u}W^e[:5u] \\
&+ x^{4u}W^e[:4u] + x^{6u}W^e[:2u] + x^{7u}W^e[:u] + x^{4u}W^e[:7u] \\
&+ x^{5u}W^e[:6u] + x^{6u}W^e[:5u] + x^{7u}W^e[:4u] + x^{9u}W^e[:2u] \\
&+ x^{10u}W^e[:u] + x^{6u}W^e[:7u] + x^{7u}W^e[:6u] + x^{8u}W^e[:5u] \\
&+ x^{9u}W^e[:4u] + x^{11u}W^e[:2u] + x^{12u}W^e[:u] + x^{7u}W^e[:7u] \\
&+ x^{8u}W^e[:6u] + x^{10u}W^e[:4u] + x^{12u}W^e[:2u] \\
&+ (x^{7u} + x^{8u} + x^{11u} + x^{13u})R^e.
\end{aligned}
$$

For all integers $k \geq 2$ and $u = 2^{2k}$, the following identities hold.

$$
\begin{aligned}
M^o[:14u] = {}& M^o[:7u] + x^uM^o[:6u] + x^{2u}M^o[:5u] + x^{3u}M^o[:4u] + x^{5u}M^o[:2u] \\
&+ x^{6u}M^o[:u] + x^uM^o[:7u] + x^{2u}M^o[:6u] + x^{3u}M^o[:5u] \\
&+ x^{4u}M^o[:4u] + x^{6u}M^o[:2u] + x^{7u}M^o[:u] + x^{4u}M^o[:7u] \\
&+ x^{5u}M^o[:6u] + x^{6u}M^o[:5u] + x^{7u}M^o[:4u] + x^{9u}M^o[:2u] \\
&+ x^{10u}M^o[:u] + x^{6u}M^o[:7u] + x^{7u}M^o[:6u] + x^{8u}M^o[:5u] \\
&+ x^{9u}M^o[:4u] + x^{11u}M^o[:2u] + x^{12u}M^o[:u] + x^{7u}M^o[:7u] \\
&+ x^{8u}M^o[:6u] + x^{10u}M^o[:4u] + x^{12u}M^o[:2u] \\
&+ (x^{7u} + x^{8u} + x^{11u} + x^{13u})R^o, \\
W^o[:14u] = {}& W^o[:7u] + x^uW^o[:6u] + x^{2u}W^o[:5u] + x^{3u}W^o[:4u] + x^{5u}W^o[:2u] \\
&+ x^{6u}W^o[:u] + x^uW^o[:7u] + x^{2u}W^o[:6u] + x^{3u}W^o[:5u] \\
&+ x^{4u}W^o[:4u] + x^{6u}W^o[:2u] + x^{7u}W^o[:u] + x^{4u}W^o[:7u] \\
&+ x^{5u}W^o[:6u] + x^{6u}W^o[:5u] + x^{7u}W^o[:4u] + x^{9u}W^o[:2u] \\
&+ x^{10u}W^o[:u] + x^{6u}W^o[:7u] + x^{7u}W^o[:6u] + x^{8u}W^o[:5u] \\
&+ x^{9u}W^o[:4u] + x^{11u}W^o[:2u] + x^{12u}W^o[:u] + x^{7u}W^o[:7u] \\
&+ x^{8u}W^o[:6u] + x^{10u}W^o[:4u] + x^{12u}W^o[:2u] \\
&+ (x^{7u} + x^{8u} + x^{11u} + x^{13u})R^o.
\end{aligned}
$$

Proof. To prove Lemma 2.2 we first construct an automaton for each sequence concerned, and then transform the conditions on infinitely many k's into finitely many conditions on the states of the automaton. In the following, we will prove that for $T = M^o_{0,0}$, for all integer $k \geq 2$ and $u = 2^{2k}$,

$$
\begin{aligned}
T[:14u] = {}& T[:7u] + x^uT[:6u] + x^{2u}T[:5u] + x^{3u}T[:4u] + x^{5u}T[:2u] + x^{6u}T[:u] \\
&+ x^uT[:7u] + x^{2u}T[:6u] + x^{3u}T[:5u] + x^{4u}T[:4u] + x^{6u}T[:2u] \\
&+ x^{7u}T[:u] + x^{4u}T[:7u] + x^{5u}T[:6u] + x^{6u}T[:5u] + x^{7u}T[:4u] \\
&+ x^{9u}T[:2u] + x^{10u}T[:u] + x^{6u}T[:7u] + x^{7u}T[:6u] + x^{8u}T[:5u] \\
&+ x^{9u}T[:4u] + x^{11u}T[:2u] + x^{12u}T[:u] + x^{7u}T[:7u] + x^{8u}T[:6u]
\end{aligned}
$$

$$+ x^{10u}T[:4u] + x^{12u}T[:2u] + (x^{7u} + x^{8u} + x^{11u} + x^{13u}).$$

The proof of the other 15 cases are similar. We break down the above identity into 7 parts:

$$\begin{aligned}
x^7u &= x^{6u}T[u:2u] + x^{5u}T[2u:3u] + x^{3u}T[4u:5u] + x^{2u}T[5u:6u] \\
&\quad + x^{u}T[6u:7u] + T[7u:8u], \\
x^8u &= x^{7u}T[u:2u] + x^{5u}T[3u:4u] + x^{4u}T[4u:5u] + T[8u:9u], \\
0 &= x^{7u}T[2u:3u] + x^{5u}T[4u:5u] + x^{4u}T[5u:6u] + T[9u:10u], \\
0 &= x^{7u}T[3u:4u] + x^{5u}T[5u:6u] + x^{4u}T[6u:7u] + T[10u:11u], \\
x^1 1u &= x^{11u}T[:u] + x^{10u}T[u:2u] + x^{9u}T[2u:3u] + x^{6u}T[5u:6u] \\
&\quad + T[11u:12u], \\
0 &= x^{11u}T[u:2u] + x^{10u}T[2u:3u] + x^{9u}T[3u:4u] + x^{6u}T[6u:7u] \\
&\quad + T[12u:13u], \\
x^1 3u &= x^{12u}T[u:2u] + x^{10u}T[3u:4u] + x^{8u}T[5u:6u] + x^{7u}T[6u:7u] \\
&\quad + T[13u:14u],
\end{aligned}$$

which can be rewritten as

$$\begin{aligned}
0 &= T[[1w]_2] + T[[10w]_2] + T[[100w]_2] + T[[101w]_2] + T[[110w]_2] \\
&\quad + T[[111w]_2], \tag{2.7} \\
0 &= T[[1w]_2] + T[[11w]_2] + T[[100w]_2] + T[[1000w]_2], \tag{2.8} \\
0 &= T[[10w]_2] + T[[100w]_2] + T[[101w]_2] + T[[1001w]_2], \tag{2.9} \\
0 &= T[[11w]_2] + T[[101w]_2] + T[[110w]_2] + T[[1010w]_2], \tag{2.10} \\
0 &= T[[w]_2] + T[[1w]_2] + T[[10w]_2] + T[[101w]_2] + T[[1011w]_2], \tag{2.11} \\
0 &= T[[1w]_2] + T[[10w]_2] + T[[11w]_2] + T[[110w]_2] + T[[1100w]_2], \tag{2.12} \\
0 &= T[[1w]_2] + T[[11w]_2] + T[[101w]_2] + T[[110w]_2] + T[[1101w]_2], \tag{2.13}
\end{aligned}$$

for all binary word w of length $2k$ and $w \neq 0^{2k}$, and

$$\begin{aligned}
1 &= T[[1w]_2] + T[[10w]_2] + T[[100w]_2] + T[[101w]_2] + T[[110w]_2] \\
&\quad + T[[111w]_2], \tag{2.14} \\
1 &= T[[1w]_2] + T[[11w]_2] + T[[100w]_2] + T[[1000w]_2], \tag{2.15} \\
0 &= T[[10w]_2] + T[[100w]_2] + T[[101w]_2] + T[[1001w]_2], \tag{2.16} \\
0 &= T[[11w]_2] + T[[101w]_2] + T[[110w]_2] + T[[1010w]_2], \tag{2.17} \\
1 &= T[[w]_2] + T[[1w]_2] + T[[10w]_2] + T[[101w]_2] + T[[1011w]_2], \tag{2.18} \\
0 &= T[[1w]_2] + T[[10w]_2] + T[[11w]_2] + T[[110w]_2] + T[[1100w]_2], \tag{2.19} \\
1 &= T[[1w]_2] + T[[11w]_2] + T[[101w]_2] + T[[110w]_2] + T[[1101w]_2], \tag{2.20}
\end{aligned}$$

for $w = 0^{2k}$.

First we calculate an 2-automaton that generates T from its minimal polynomial and its first terms. This automaton has 3418 states; its transition function and output function can be found in the annex. Let $A(s, w)$ denote the state reached after reading w from right to left starting from the state s, and τ the output function. Define

$$E_{2k} = \{A(i,w) : |w| = 2k, w \neq 0^{2k}\}.$$

Identities (2.7) through (2.20) can be written as

$$\begin{aligned}
0 &= \tau(A(s,1)) + \tau(A(s,10)) + \tau(A(s,100)) + \tau(A(s,101)) \\
&\quad + \tau(A(s,110)) + \tau(A(s,111)), && (2.21)\\
0 &= \tau(A(s,1)) + \tau(A(s,11)) + \tau(A(s,100)) + \tau(A(s,1000)), && (2.22)\\
0 &= \tau(A(s,10)) + \tau(A(s,100)) + \tau(A(s,101)) + \tau(A(s,1001)), && (2.23)\\
0 &= \tau(A(s,11)) + \tau(A(s,101)) + \tau(A(s,110)) + \tau(A(s,1010)), && (2.24)\\
0 &= \tau(A(s,\epsilon)) + \tau(A(s,1)) + \tau(A(s,10)) + \tau(A(s,101)) \\
&\quad + \tau(A(s,1011)), && (2.25)\\
0 &= \tau(A(s,1)) + \tau(A(s,10)) + \tau(A(s,11)) + \tau(A(s,110)) \\
&\quad + \tau(A(s,1100)), && (2.26)\\
0 &= \tau(A(s,1)) + \tau(A(s,11)) + \tau(A(s,101)) + \tau(A(s,110)) \\
&\quad + \tau(A(s,1101)), && (2.27)
\end{aligned}$$

for all $s \in E_{2k}$, and

$$\begin{aligned}
1 &= \tau(A(s,1)) + \tau(A(s,10)) + \tau(A(s,100)) + \tau(A(s,101)) \\
&\quad + \tau(A(s,110)) + \tau(A(s,111)), && (2.28)\\
1 &= \tau(A(s,1)) + \tau(A(s,11)) + \tau(A(s,100)) + \tau(A(s,1000)), && (2.29)\\
0 &= \tau(A(s,10)) + \tau(A(s,100)) + \tau(A(s,101)) + \tau(A(s,1001)), && (2.30)\\
0 &= \tau(A(s,11)) + \tau(A(s,101)) + \tau(A(s,110)) + \tau(A(s,1010)), && (2.31)\\
1 &= \tau(A(s,\epsilon)) + \tau(A(s,1)) + \tau(A(s,10)) + \tau(A(s,101)) \\
&\quad + \tau(A(s,1011)), && (2.32)\\
0 &= \tau(A(s,1)) + \tau(A(s,10)) + \tau(A(s,11)) + \tau(A(s,110)) \\
&\quad + \tau(A(s,1100)), && (2.33)\\
1 &= \tau(A(s,1)) + \tau(A(s,11)) + \tau(A(s,101)) + \tau(A(s,110)) \\
&\quad + \tau(A(s,1101)), && (2.34)
\end{aligned}$$

for $s = A(i, 0^{2k})$. We find that $(A(i, 0^{38}), E_{38}) = (A(i, 0^{14}), E_{14})$, so that we only have to verify that identities (2.21) through (2.34) hold for $2 \leq k \leq 19$, which turns out to be true. □

In the following lemma, we express M_{2k}, M_{2k+1}, W_{2k}, and W_{2k+1} in terms of M^e, M^o, W^e, and W^o.

Lemma 2.3. *For all integer $k \geq 2$, and $u = 2^{2k-1}$,*

$$\begin{aligned}
M_{2k} &= M^e[:7u] + x^u M^e[:6u] + x^{2u} M^e[:5u] + x^{3u} M^e[:4u] + x^{5u} M^e[:2u] \\
&\quad + x^{6u} M^e[:u] + x^{7u} R^e, \\
W_{2k} &= W^e[:7u] + x^u W^e[:6u] + x^{2u} W^e[:5u] + x^{3u} W^e[:4u] + x^{5u} W^e[:2u] \\
&\quad + x^{6u} W^e[:u] + x^{7u} R^e.
\end{aligned}$$

For all integer $k \geq 2$, and $u = 2^{2k}$,

$$\begin{aligned}
M_{2k+1} &= M^o[:7u] + x^u M^o[:6u] + x^{2u} M^o[:5u] + x^{3u} M^o[:4u] + x^{5u} M^o[:2u] \\
&\quad + x^{6u} M^o[:u] + x^{7u} R^o, \\
W_{2k+1} &= W^o[:7u] + x^u W^o[:6u] + x^{2u} W^o[:5u] + x^{3u} W^o[:4u] + x^{5u} W^o[:2u] \\
&\quad + x^{6u} W^o[:u] + x^{7u} R^o.
\end{aligned}$$

Proof. We call the four identities in Lemma 2.3 also by the name M_{2k}, W_{2k}, M_{2k+1}, and W_{2k+1}. For $n = 2$, the identities can be verified directly. For $n \geq 2$, we claim that

$$\begin{aligned}
M_{2k} \wedge W_{2k} &\Rightarrow M_{2k+1} \wedge W_{2k+1}, \\
M_{2k+1} \wedge W_{2k+1} &\Rightarrow M_{2k+2} \wedge W_{2k+2}.
\end{aligned}$$

We give the proof of

$$M_{2k} \wedge W_{2k} \Rightarrow M_{2k+1},$$

the other ones being similar. Set $u = 2^{2k}$ and $v = 2^{2k-1}$. By definition and induction hypothesis, the left side of identity M_{2k+1} is equal to

$$\begin{aligned}
W_{2k} M_{2k} &= \big(W^e[:7v] + x^v W^e[:6v] + x^{2v} W^e[:5v] + x^{3v} W^e[:4v] \\
&\quad + x^{5v} W^e[:2v] + x^{6v} W^e[:v] + x^{7u} R^e\big) \times \big(M^e[:7v] + x^v M^e[:6v] \\
&\quad + x^{2v} M^e[:5v] + x^{3v} M^e[:4v] + x^{5v} M^e[:2v] + x^{6v} M^e[:v] + x^{7u} R^e \\
&\quad \big); \qquad (2.35)
\end{aligned}$$

Call this expression lhs. Note that both sides of identity M_{2k+1} have the same term of highest degree $x^{14v} R^o$. Therefore we only need to prove that their difference is $O(x^{14v})$. Using Lemma 2.1 it can be seen that the right side of identity M_{2k+1} is congruent, modulo x^{14v}, to

$$\begin{aligned}
&W^e[:14v] M^e[:14v] + x^{2v} W^e[:12v] M^e[:12v] + x^{4v} W^e[:10v] M^e[:10v] \\
&\qquad + x^{6v} W^e[:8v] M^e[:8v] + x^{10v} W^e[:4v] M^e[:4v] + x^{12v} W^e[:2v] M^e[:2v].
\end{aligned}$$

For all $n \leq 14$, replace the occurrences of $W^e[:n \cdot v]$ and $M^e[:n \cdot v]$ in the above expression by the reduction modulo $x^{n \cdot v}$ of the right side of the corresponding identity in Lemma 2.2 and get a new expression, which we call rhs. Define

$$\begin{aligned}
X &:= x^v, \\
a_n &:= W^e[n \cdot v : (n+1) \cdot v]/X^n, \\
b_n &:= M^e[n \cdot v : (n+1) \cdot v]/X^n, \\
c &:= R^e.
\end{aligned}$$

Using the notation introduced above, we can represent the expressions lhs (2.35) and rhs as polynomials in $\mathbb{F}_2[a_1, ..., a_{14}, b_1, ..., b_{14}, c][X]$. Note that it is not a problem that a_j commutes with b_k while W^e does not commute with M^e, because in the expressions concerned, the products of W^e-terms and M^e-terms are always in the same order. We let the computer do the simplification and check that the difference between these two polynomials is indeed $O(X^{14})$, which completes the proof. $\square$

Proof of Theorem 1.1. We prove the theorem for $\mathrm{CF}(a,b)$; for $\mathrm{CF}(b,a)$, the proof is similar. By Lemma 2.3, we have For all $0 \le j,k \le 1$,

$$\lim_{n\to\infty} M_{2n,j,k} = M^e_{j,k},$$
$$\lim_{n\to\infty} M_{2n+1,j,k} = M^o_{j,k},$$
$$\lim_{n\to\infty} W_{2n,j,k} = W^e_{j,k},$$
$$\lim_{n\to\infty} W_{2n+1,j,k} = W^o_{j,k}.$$

Let $z = 1/x$. By the convergence theorem and identity (2.2),

$$\mathrm{CF}(a,b) = \frac{M^e_{0,1}(x)}{M^e_{0,0}(x)}.$$

By definition, $\phi(M^e,0,1)$ and $\phi(M^e,0,0)$ are minimal polynomials of $M^e_{0,1}$ and $M^e_{0,0}$. Therefore

$$P(x,y) = \mathrm{Res}_t\left(\phi(M^e,0,1)(x,t), y^{12}\phi(M^e,0,1)(x,t/y)\right)$$

is an annihilating polynomial of $f(x) = M^e_{0,1}/M^e_{0,0}$.

Define

$$Q(x,y) = q_4(x)y^4 + q_3(x)y^3 + q_2(x)y^2 + q_1(x)y + q_0(x),$$

where

$$q_0(x) = x^{22} + x^{18} + x^{17} + x^{16} + x^{13} + x^{10} + x^9 + x^8 + x^7,$$
$$q_1(x) = x^{20} + x^{18} + x^{15} + x^{13} + x^{11} + x^{10} + x^9 + x^7 + x^4 + x^3,$$
$$q_2(x) = x^{22} + x^{20} + x^{18} + x^{16} + x^{10} + x^4 + x^2 + 1,$$
$$q_3(x) = x^{20} + x^{18} + x^{15} + x^{13} + x^{11} + x^{10} + x^9 + x^7 + x^4 + x^3,$$
$$q_4(x) = x^{22} + x^{17} + x^{14} + x^{13} + x^{12} + x^9 + x^8 + x^7 + x^6.$$

The polynomial $Q(x,y)$ is the candidate for the minimal polynomial of $f(x)$ found by Padé-Hermite approximation. To prove that it is indeed the minimal polynomial of $f(x)$, we only need to prove that it is an irreducible factor of $P(x,y)$ of multiplicity m and $R(x,y) := P(x,y)/Q(x,y)^m$ is not an annihilating polynomial of $f(x)$. We verify the first point directly. For the second point, we find that when we truncate $f(x)$ to order 216, and substitute it for y in $R(z,y)$, we get a series with valuation smaller than 216, which proves that $R(z,y)$ is not an annihilating polynomial of $f(x)$. Finally, $z^{12}Q(1/z,y)$ is the minimal polynomial of $\mathrm{CF}(a,b) = f(1/z)$. $\square$

3. Annexe

All 16 polynomials are of the form

$$p_0(x) + p_3(x)y^3 + p_6(x)y^6 + p_9(x)y^9 + p_{12}(x)y^{12}.$$

The coefficients $p_j(x)$ and the 16 initial terms to determine the solutions uniquely are given below.

For $\phi(M^e,0,0)$:

$$\begin{aligned} p_0(x) = {} & x^{120} + x^{118} + x^{116} + x^{112} + x^{106} + x^{104} + x^{102} + x^{100} + x^{92} + x^{90} \\ & + x^{86} + x^{80} + x^{78} + x^{72} + x^{70} + x^{68} + x^{60} + x^{52} + x^{50} + x^{48} + x^{44} \\ & + x^{42} + x^{36}, \end{aligned}$$

$$\begin{aligned}
p_3(x) &= x^{116} + x^{114} + x^{112} + x^{98} + x^{96} + x^{90} + x^{86} + x^{82} + x^{70} + x^{68} + x^{62} \\
&\quad + x^{60} + x^{58} + x^{56} + x^{54} + x^{50} + x^{36} + x^{30} + x^{28} + x^{24} + x^{22} + x^{20}, \\
p_6(x) &= x^{116} + x^{114} + x^{108} + x^{106} + x^{102} + x^{98} + x^{96} + x^{94} + x^{90} + x^{86} + x^{84} \\
&\quad + x^{82} + x^{80} + x^{78} + x^{76} + x^{72} + x^{70} + x^{68} + x^{64} + x^{60} + x^{54} + x^{50} \\
&\quad + x^{48} + x^{42} + x^{34} + x^{28} + x^{24} + x^{20} + x^{16} + x^{10} + x^2 + 1, \\
p_9(x) &= x^{116} + x^{114} + x^{112} + x^{108} + x^{104} + x^{102} + x^{100} + x^{98} + x^{90} + x^{88} \\
&\quad + x^{82} + x^{74} + x^{72} + x^{70} + x^{66} + x^{60} + x^{54} + x^{46} + x^{44} + x^{42} + x^{40} \\
&\quad + x^{36} + x^{32} + x^{30} + x^{28} + x^{26} + x^{20} + x^6, \\
p_{12}(x) &= x^{120} + x^{118} + x^{114} + x^{112} + x^{104} + x^{102} + x^{98} + x^{94} + x^{90} + x^{88} \\
&\quad + x^{72} + x^{70} + x^{66} + x^{62} + x^{58} + x^{56} + x^{32} + x^{30} + x^{26} + x^{24} + x^{16} \\
&\quad + x^{14} + x^{10} + x^6 + x^2 + 1,
\end{aligned}$$

and the initial terms are [1, 0, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 1, 0, 0, 0].

For $\phi(M^e, 0, 1)$:

$$\begin{aligned}
p_0(x) &= x^{117} + x^{112} + x^{111} + x^{109} + x^{107} + x^{104} + x^{102} + x^{101} + x^{99} + x^{98} \\
&\quad + x^{97} + x^{96} + x^{95} + x^{94} + x^{93} + x^{91} + x^{90} + x^{89} + x^{85} + x^{84} + x^{81} \\
&\quad + x^{80} + x^{79} + x^{77} + x^{76} + x^{75} + x^{74} + x^{73} + x^{71} + x^{70} + x^{69} + x^{65} \\
&\quad + x^{63} + x^{62} + x^{58} + x^{55} + x^{54} + x^{52} + x^{50} + x^{48} + x^{46} + x^{45} + x^{43} \\
&\quad + x^{42} + x^{41} + x^{40} + x^{39}, \\
p_3(x) &= x^{99} + x^{87} + x^{85} + x^{81} + x^{79} + x^{77} + x^{75} + x^{73} + x^{71} + x^{69} + x^{67} \\
&\quad + x^{65} + x^{63} + x^{61} + x^{57} + x^{55} + x^{53} + x^{49} + x^{39} + x^{37} + x^{33} + x^{27}, \\
p_6(x) &= x^{105} + x^{100} + x^{96} + x^{95} + x^{92} + x^{90} + x^{88} + x^{87} + x^{86} + x^{85} + x^{84} \\
&\quad + x^{81} + x^{79} + x^{77} + x^{76} + x^{75} + x^{74} + x^{65} + x^{60} + x^{57} + x^{56} + x^{55} \\
&\quad + x^{50} + x^{49} + x^{46} + x^{45} + x^{44} + x^{42} + x^{41} + x^{39} + x^{38} + x^{36} + x^{35} \\
&\quad + x^{33} + x^{32} + x^{30} + x^{27} + x^{26} + x^{25} + x^{23} + x^{21} + x^{20} + x^{19} + x^{18}, \\
p_9(x) &= x^{111} + x^{101} + x^{99} + x^{97} + x^{87} + x^{83} + x^{77} + x^{71} + x^{69} + x^{67} + x^{65} \\
&\quad + x^{63} + x^{61} + x^{59} + x^{57} + x^{55} + x^{53} + x^{51} + x^{49} + x^{47} + x^{45} + x^{41} \\
&\quad + x^{39} + x^{37} + x^{35} + x^{31} + x^{25} + x^{19} + x^{17} + x^{13} + x^{11} + x^9, \\
p_{12}(x) &= x^{117} + x^{112} + x^{108} + x^{104} + x^{100} + x^{97} + x^{96} + x^{81} + x^{76} + x^{72} + x^{68} \\
&\quad + x^{65} + x^{64} + x^{49} + x^{44} + x^{40} + x^{37} + x^{36} + x^{33} + x^{28} + x^{24} + x^{21} \\
&\quad + x^{20} + x^5 + x + 1,
\end{aligned}$$

and the initial terms are [0, 0, 0, 1, 0, 0, 1, 0, 0, 1, 1, 0, 1, 0, 1, 0].

For $\phi(M^e, 1, 0)$:

$$\begin{aligned}
p_0(x) &= x^{117} + x^{112} + x^{111} + x^{109} + x^{107} + x^{104} + x^{102} + x^{101} + x^{99} + x^{98} \\
&\quad + x^{97} + x^{96} + x^{95} + x^{94} + x^{93} + x^{91} + x^{90} + x^{89} + x^{85} + x^{84} + x^{81} \\
&\quad + x^{80} + x^{79} + x^{77} + x^{76} + x^{75} + x^{74} + x^{73} + x^{71} + x^{70} + x^{69} + x^{65}
\end{aligned}$$

$$+ x^{63} + x^{62} + x^{58} + x^{55} + x^{54} + x^{52} + x^{50} + x^{48} + x^{46} + x^{45} + x^{43} + x^{42} + x^{41} + x^{40} + x^{39},$$

$$p_3(x) = x^{99} + x^{87} + x^{85} + x^{81} + x^{79} + x^{77} + x^{75} + x^{73} + x^{71} + x^{69} + x^{67} + x^{65} + x^{63} + x^{61} + x^{57} + x^{55} + x^{53} + x^{49} + x^{39} + x^{37} + x^{33} + x^{27},$$

$$p_6(x) = x^{105} + x^{100} + x^{96} + x^{95} + x^{92} + x^{90} + x^{88} + x^{87} + x^{86} + x^{85} + x^{84} + x^{81} + x^{79} + x^{77} + x^{76} + x^{75} + x^{74} + x^{65} + x^{60} + x^{57} + x^{56} + x^{55} + x^{50} + x^{49} + x^{46} + x^{45} + x^{44} + x^{42} + x^{41} + x^{39} + x^{38} + x^{36} + x^{35} + x^{33} + x^{32} + x^{30} + x^{27} + x^{26} + x^{25} + x^{23} + x^{21} + x^{20} + x^{19} + x^{18},$$

$$p_9(x) = x^{111} + x^{101} + x^{99} + x^{97} + x^{87} + x^{83} + x^{77} + x^{71} + x^{69} + x^{67} + x^{65} + x^{63} + x^{61} + x^{59} + x^{57} + x^{55} + x^{53} + x^{51} + x^{49} + x^{47} + x^{45} + x^{41} + x^{39} + x^{37} + x^{35} + x^{31} + x^{25} + x^{19} + x^{17} + x^{13} + x^{11} + x^{9},$$

$$p_{12}(x) = x^{117} + x^{112} + x^{108} + x^{104} + x^{100} + x^{97} + x^{96} + x^{81} + x^{76} + x^{72} + x^{68} + x^{65} + x^{64} + x^{49} + x^{44} + x^{40} + x^{37} + x^{36} + x^{33} + x^{28} + x^{24} + x^{21} + x^{20} + x^{5} + x + 1,$$

and the initial terms are [0, 0, 0, 1, 0, 0, 1, 0, 0, 1, 1, 0, 1, 0, 1, 0].

For $\phi(M^e, 1, 1)$:

$$p_0(x) = x^{114} + x^{112} + x^{108} + x^{104} + x^{100} + x^{92} + x^{90} + x^{88} + x^{86} + x^{82} + x^{80} + x^{78} + x^{74} + x^{70} + x^{66} + x^{62} + x^{54} + x^{50} + x^{46} + x^{44} + x^{42},$$

$$p_3(x) = x^{110} + x^{108} + x^{104} + x^{102} + x^{100} + x^{98} + x^{94} + x^{88} + x^{86} + x^{84} + x^{78} + x^{76} + x^{66} + x^{64} + x^{62} + x^{60} + x^{56} + x^{52} + x^{44} + x^{40} + x^{36} + x^{34} + x^{32} + x^{18},$$

$$p_6(x) = x^{110} + x^{108} + x^{96} + x^{94} + x^{90} + x^{88} + x^{82} + x^{70} + x^{68} + x^{66} + x^{62} + x^{60} + x^{58} + x^{56} + x^{52} + x^{48} + x^{46} + x^{42} + x^{40} + x^{38} + x^{34} + x^{26} + x^{24} + x^{18} + x^{16} + 1,$$

$$p_9(x) = x^{110} + x^{108} + x^{104} + x^{102} + x^{96} + x^{88} + x^{82} + x^{80} + x^{78} + x^{76} + x^{74} + x^{72} + x^{70} + x^{66} + x^{62} + x^{60} + x^{52} + x^{48} + x^{46} + x^{42} + x^{40} + x^{38} + x^{36} + x^{32} + x^{30} + x^{26} + x^{24} + x^{14} + x^{12} + x^{10} + x^{8} + x^{6},$$

$$p_{12}(x) = x^{114} + x^{112} + x^{110} + x^{104} + x^{90} + x^{88} + x^{86} + x^{82} + x^{78} + x^{72} + x^{58} + x^{56} + x^{54} + x^{50} + x^{46} + x^{40} + x^{34} + x^{32} + x^{30} + x^{26} + x^{22} + x^{16} + x^{10} + x^{8} + x^{6} + 1,$$

and the initial terms are [0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 1, 0].

For $\phi(W^e, 0, 0)$:

$$p_0(x) = x^{114} + x^{112} + x^{108} + x^{106} + x^{102} + x^{100} + x^{96} + x^{94} + x^{86} + x^{82} + x^{78} + x^{70} + x^{66} + x^{62} + x^{58} + x^{56} + x^{50} + x^{44} + x^{40} + x^{38} + x^{36},$$

$$p_3(x) = x^{110} + x^{108} + x^{104} + x^{92} + x^{84} + x^{78} + x^{76} + x^{74} + x^{72} + x^{68} + x^{66}$$

$$
\begin{aligned}
&+x^{60}+x^{58}+x^{50}+x^{46}+x^{42}+x^{40}+x^{36}+x^{30}+x^{26}+x^{24}+x^{20},\\
p_6(x) &= x^{110}+x^{108}+x^{106}+x^{104}+x^{100}+x^{98}+x^{92}+x^{90}+x^{84}+x^{82}+x^{80}\\
&+x^{78}+x^{76}+x^{74}+x^{68}+x^{66}+x^{60}+x^{50}+x^{48}+x^{46}+x^{42}+x^{40}\\
&+x^{34}+x^{32}+x^{30}+x^{28}+x^{20}+x^{18}+x^{12}+1,\\
p_9(x) &= x^{110}+x^{108}+x^{104}+x^{102}+x^{96}+x^{88}+x^{82}+x^{80}+x^{78}+x^{76}+x^{74}\\
&+x^{72}+x^{70}+x^{66}+x^{62}+x^{60}+x^{52}+x^{48}+x^{46}+x^{42}+x^{40}+x^{38}\\
&+x^{36}+x^{32}+x^{30}+x^{26}+x^{24}+x^{14}+x^{12}+x^{10}+x^{8}+x^{6},\\
p_{12}(x) &= x^{114}+x^{112}+x^{110}+x^{104}+x^{90}+x^{88}+x^{86}+x^{82}+x^{78}+x^{72}+x^{58}\\
&+x^{56}+x^{54}+x^{50}+x^{46}+x^{40}+x^{34}+x^{32}+x^{30}+x^{26}+x^{22}+x^{16}\\
&+x^{10}+x^{8}+x^{6}+1,
\end{aligned}
$$

and the initial terms are [1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 1, 0].

For $\phi(W^e, 0, 1)$:

$$
\begin{aligned}
p_0(x) &= x^{117}+x^{112}+x^{111}+x^{109}+x^{107}+x^{105}+x^{104}+x^{102}+x^{101}+x^{100}\\
&+x^{99}+x^{98}+x^{94}+x^{93}+x^{91}+x^{86}+x^{85}+x^{84}+x^{83}+x^{81}+x^{80}\\
&+x^{78}+x^{74}+x^{72}+x^{71}+x^{66}+x^{65}+x^{63}+x^{62}+x^{60}+x^{59}+x^{57}\\
&+x^{56}+x^{53}+x^{52}+x^{51}+x^{50}+x^{49}+x^{47}+x^{44}+x^{43}+x^{42}+x^{41}\\
&+x^{40}+x^{39},\\
p_3(x) &= x^{99}+x^{87}+x^{85}+x^{81}+x^{79}+x^{77}+x^{75}+x^{73}+x^{71}+x^{69}+x^{67}\\
&+x^{65}+x^{63}+x^{61}+x^{57}+x^{55}+x^{53}+x^{49}+x^{39}+x^{37}+x^{33}+x^{27},\\
p_6(x) &= x^{105}+x^{100}+x^{96}+x^{95}+x^{92}+x^{90}+x^{88}+x^{87}+x^{86}+x^{85}+x^{84}\\
&+x^{81}+x^{79}+x^{77}+x^{76}+x^{75}+x^{74}+x^{65}+x^{60}+x^{57}+x^{56}+x^{55}\\
&+x^{50}+x^{49}+x^{46}+x^{45}+x^{44}+x^{42}+x^{41}+x^{39}+x^{38}+x^{36}+x^{35}\\
&+x^{33}+x^{32}+x^{30}+x^{27}+x^{26}+x^{25}+x^{23}+x^{21}+x^{20}+x^{19}+x^{18},\\
p_9(x) &= x^{111}+x^{101}+x^{99}+x^{97}+x^{87}+x^{83}+x^{77}+x^{71}+x^{69}+x^{67}+x^{65}\\
&+x^{63}+x^{61}+x^{59}+x^{57}+x^{55}+x^{53}+x^{51}+x^{49}+x^{47}+x^{45}+x^{41}\\
&+x^{39}+x^{37}+x^{35}+x^{31}+x^{25}+x^{19}+x^{17}+x^{13}+x^{11}+x^{9},\\
p_{12}(x) &= x^{117}+x^{112}+x^{108}+x^{104}+x^{100}+x^{97}+x^{96}+x^{81}+x^{76}+x^{72}+x^{68}\\
&+x^{65}+x^{64}+x^{49}+x^{44}+x^{40}+x^{37}+x^{36}+x^{33}+x^{28}+x^{24}+x^{21}\\
&+x^{20}+x^{5}+x+1,
\end{aligned}
$$

and the initial terms are [0, 0, 0, 0, 1, 1, 0, 1, 0, 0, 1, 1, 1, 0, 0, 0].

For $\phi(W^e, 1, 0)$:

$$
\begin{aligned}
p_0(x) &= x^{117}+x^{112}+x^{111}+x^{109}+x^{107}+x^{105}+x^{104}+x^{102}+x^{101}+x^{100}\\
&+x^{99}+x^{98}+x^{94}+x^{93}+x^{91}+x^{86}+x^{85}+x^{84}+x^{83}+x^{81}+x^{80}\\
&+x^{78}+x^{74}+x^{72}+x^{71}+x^{66}+x^{65}+x^{63}+x^{62}+x^{60}+x^{59}+x^{57}\\
&+x^{56}+x^{53}+x^{52}+x^{51}+x^{50}+x^{49}+x^{47}+x^{44}+x^{43}+x^{42}+x^{41}
\end{aligned}
$$

$$
\begin{aligned}
&+ x^{40} + x^{39},\\
p_3(x) &= x^{99} + x^{87} + x^{85} + x^{81} + x^{79} + x^{77} + x^{75} + x^{73} + x^{71} + x^{69} + x^{67}\\
&+ x^{65} + x^{63} + x^{61} + x^{57} + x^{55} + x^{53} + x^{49} + x^{39} + x^{37} + x^{33} + x^{27},\\
p_6(x) &= x^{105} + x^{100} + x^{96} + x^{95} + x^{92} + x^{90} + x^{88} + x^{87} + x^{86} + x^{85} + x^{84}\\
&+ x^{81} + x^{79} + x^{77} + x^{76} + x^{75} + x^{74} + x^{65} + x^{60} + x^{57} + x^{56} + x^{55}\\
&+ x^{50} + x^{49} + x^{46} + x^{45} + x^{44} + x^{42} + x^{41} + x^{39} + x^{38} + x^{36} + x^{35}\\
&+ x^{33} + x^{32} + x^{30} + x^{27} + x^{26} + x^{25} + x^{23} + x^{21} + x^{20} + x^{19} + x^{18},\\
p_9(x) &= x^{111} + x^{101} + x^{99} + x^{97} + x^{87} + x^{83} + x^{77} + x^{71} + x^{69} + x^{67} + x^{65}\\
&+ x^{63} + x^{61} + x^{59} + x^{57} + x^{55} + x^{53} + x^{51} + x^{49} + x^{47} + x^{45} + x^{41}\\
&+ x^{39} + x^{37} + x^{35} + x^{31} + x^{25} + x^{19} + x^{17} + x^{13} + x^{11} + x^{9},\\
p_{12}(x) &= x^{117} + x^{112} + x^{108} + x^{104} + x^{100} + x^{97} + x^{96} + x^{81} + x^{76} + x^{72} + x^{68}\\
&+ x^{65} + x^{64} + x^{49} + x^{44} + x^{40} + x^{37} + x^{36} + x^{33} + x^{28} + x^{24} + x^{21}\\
&+ x^{20} + x^{5} + x + 1,
\end{aligned}
$$

and the initial terms are [0, 0, 0, 0, 1, 1, 0, 1, 0, 0, 1, 1, 1, 0, 0, 0].

For $\phi(W^e, 1, 1)$:

$$
\begin{aligned}
p_0(x) &= x^{120} + x^{118} + x^{116} + x^{110} + x^{102} + x^{98} + x^{96} + x^{94} + x^{80} + x^{76} + x^{74}\\
&+ x^{72} + x^{70} + x^{62} + x^{60} + x^{58} + x^{56} + x^{52} + x^{50} + x^{48} + x^{42},\\
p_3(x) &= x^{116} + x^{114} + x^{112} + x^{108} + x^{106} + x^{102} + x^{98} + x^{94} + x^{86} + x^{84}\\
&+ x^{78} + x^{76} + x^{74} + x^{72} + x^{70} + x^{68} + x^{66} + x^{64} + x^{60} + x^{56} + x^{54}\\
&+ x^{50} + x^{34} + x^{28} + x^{20} + x^{18},\\
p_6(x) &= x^{116} + x^{114} + x^{112} + x^{110} + x^{106} + x^{104} + x^{98} + x^{96} + x^{94} + x^{92}\\
&+ x^{86} + x^{84} + x^{82} + x^{80} + x^{78} + x^{66} + x^{62} + x^{60} + x^{58} + x^{56} + x^{52}\\
&+ x^{50} + x^{48} + x^{42} + x^{40} + x^{38} + x^{36} + x^{34} + x^{32} + x^{30} + x^{28} + x^{24}\\
&+ x^{18} + x^{14} + x^{12} + x^{10} + x^{2} + 1,\\
p_9(x) &= x^{116} + x^{114} + x^{112} + x^{108} + x^{104} + x^{102} + x^{100} + x^{98} + x^{90} + x^{88}\\
&+ x^{82} + x^{74} + x^{72} + x^{70} + x^{66} + x^{60} + x^{54} + x^{46} + x^{44} + x^{42} + x^{40}\\
&+ x^{36} + x^{32} + x^{30} + x^{28} + x^{26} + x^{20} + x^{6},\\
p_{12}(x) &= x^{120} + x^{118} + x^{114} + x^{112} + x^{104} + x^{102} + x^{98} + x^{94} + x^{90} + x^{88}\\
&+ x^{72} + x^{70} + x^{66} + x^{62} + x^{58} + x^{56} + x^{32} + x^{30} + x^{26} + x^{24} + x^{16}\\
&+ x^{14} + x^{10} + x^{6} + x^{2} + 1,
\end{aligned}
$$

and the initial terms are [0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 0, 0, 0].

For $\phi(M^o, 0, 0)$:

$$
\begin{aligned}
p_0(x) &= x^{117} + x^{113} + x^{112} + x^{109} + x^{105} + x^{102} + x^{95} + x^{92} + x^{91} + x^{90}\\
&+ x^{88} + x^{86} + x^{85} + x^{84} + x^{82} + x^{81} + x^{80} + x^{78} + x^{76} + x^{74} + x^{73}\\
&+ x^{71} + x^{70} + x^{68} + x^{65} + x^{64} + x^{63} + x^{61} + x^{59} + x^{58} + x^{51} + x^{47}
\end{aligned}
$$

$$
\begin{aligned}
&+ x^{40} + x^{39} + x^{38} + x^{37} + x^{36},\\
p_3(x) &= x^{109} + x^{105} + x^{104} + x^{96} + x^{94} + x^{93} + x^{89} + x^{87} + x^{86} + x^{85} + x^{84}\\
&+ x^{82} + x^{80} + x^{79} + x^{78} + x^{77} + x^{75} + x^{73} + x^{71} + x^{70} + x^{67} + x^{64}\\
&+ x^{63} + x^{62} + x^{59} + x^{55} + x^{53} + x^{51} + x^{49} + x^{46} + x^{45} + x^{44} + x^{43}\\
&+ x^{42} + x^{39} + x^{36} + x^{34} + x^{33} + x^{32} + x^{28} + x^{27} + x^{26} + x^{25} + x^{24},\\
p_6(x) &= x^{113} + x^{109} + x^{108} + x^{105} + x^{104} + x^{102} + x^{100} + x^{96} + x^{95} + x^{93}\\
&+ x^{90} + x^{89} + x^{86} + x^{85} + x^{83} + x^{80} + x^{79} + x^{78} + x^{77} + x^{75} + x^{71}\\
&+ x^{69} + x^{66} + x^{65} + x^{58} + x^{57} + x^{56} + x^{55} + x^{47} + x^{46} + x^{44} + x^{43}\\
&+ x^{41} + x^{38} + x^{37} + x^{32} + x^{30} + x^{28} + x^{22} + x^{20} + x^{19} + x^{18} + x^{17}\\
&+ x^{15} + x^{14} + x^{13} + x^{12} + x^{5} + x + 1,\\
p_9(x) &= x^{109} + x^{104} + x^{100} + x^{96} + x^{93} + x^{92} + x^{77} + x^{72} + x^{68} + x^{64} + x^{61}\\
&+ x^{60} + x^{45} + x^{40} + x^{36} + x^{32} + x^{28} + x^{24} + x^{20} + x^{16} + x^{13} + x^{12},\\
p_{12}(x) &= x^{117} + x^{112} + x^{109} + x^{108} + x^{97} + x^{93} + x^{92} + x^{81} + x^{77} + x^{76} + x^{65}\\
&+ x^{61} + x^{60} + x^{49} + x^{45} + x^{44} + x^{37} + x^{33} + x^{32} + x^{21} + x^{16} + x^{13}\\
&+ x^{12} + x^{5} + x + 1,
\end{aligned}
$$

and the initial terms are [1, 0, 0, 0, 0, 0, 1, 1, 0, 0, 1, 1, 1, 1, 1, 0].

For $\phi(M^o, 0, 1)$:

$$
\begin{aligned}
p_0(x) &= x^{120} + x^{114} + x^{112} + x^{111} + x^{109} + x^{108} + x^{106} + x^{104} + x^{103} + x^{102}\\
&+ x^{101} + x^{99} + x^{98} + x^{94} + x^{93} + x^{92} + x^{91} + x^{88} + x^{87} + x^{85} + x^{83}\\
&+ x^{79} + x^{78} + x^{73} + x^{70} + x^{67} + x^{64} + x^{63} + x^{62} + x^{60} + x^{59} + x^{57}\\
&+ x^{54} + x^{53} + x^{52} + x^{49} + x^{48} + x^{47} + x^{45} + x^{41} + x^{39},\\
p_3(x) &= x^{102} + x^{98} + x^{97} + x^{92} + x^{90} + x^{88} + x^{87} + x^{86} + x^{85} + x^{84} + x^{79}\\
&+ x^{75} + x^{71} + x^{67} + x^{63} + x^{62} + x^{59} + x^{58} + x^{57} + x^{55} + x^{54} + x^{52}\\
&+ x^{51} + x^{49} + x^{48} + x^{45} + x^{43} + x^{41} + x^{40} + x^{39} + x^{38} + x^{37} + x^{34}\\
&+ x^{32} + x^{30} + x^{29} + x^{28} + x^{27},\\
p_6(x) &= x^{108} + x^{100} + x^{98} + x^{96} + x^{92} + x^{86} + x^{82} + x^{80} + x^{78} + x^{76} + x^{74}\\
&+ x^{68} + x^{58} + x^{56} + x^{52} + x^{50} + x^{48} + x^{46} + x^{32} + x^{28} + x^{24} + x^{22}\\
&+ x^{20} + x^{18},\\
p_9(x) &= x^{114} + x^{110} + x^{109} + x^{106} + x^{101} + x^{98} + x^{97} + x^{94} + x^{90} + x^{89} + x^{82}\\
&+ x^{78} + x^{77} + x^{74} + x^{69} + x^{66} + x^{65} + x^{62} + x^{58} + x^{57} + x^{50} + x^{46}\\
&+ x^{45} + x^{42} + x^{37} + x^{33} + x^{29} + x^{25} + x^{21} + x^{18} + x^{17} + x^{14} + x^{10}\\
&+ x^{9},\\
p_{12}(x) &= x^{120} + x^{108} + x^{100} + x^{96} + x^{92} + x^{84} + x^{80} + x^{76} + x^{68} + x^{64} + x^{60}\\
&+ x^{52} + x^{48} + x^{44} + x^{40} + x^{36} + x^{32} + x^{24} + x^{12} + x^{8} + x^{4} + 1,
\end{aligned}
$$

and the initial terms are [0, 0, 0, 1, 0, 0, 1, 0, 0, 0, 0, 1, 0, 1, 1, 1].

For $\phi(M^o, 1, 0)$:

$$\begin{aligned}
p_0(x) &= x^{124} + x^{118} + x^{115} + x^{113} + x^{106} + x^{104} + x^{103} + x^{100} + x^{98} + x^{97} \\
&\quad + x^{96} + x^{95} + x^{93} + x^{91} + x^{87} + x^{86} + x^{84} + x^{83} + x^{82} + x^{80} + x^{79} \\
&\quad + x^{75} + x^{72} + x^{70} + x^{67} + x^{66} + x^{65} + x^{63} + x^{62} + x^{60} + x^{56} + x^{55} \\
&\quad + x^{53} + x^{51} + x^{46} + x^{44} + x^{43} + x^{41} + x^{39}, \\
p_3(x) &= x^{106} + x^{102} + x^{101} + x^{98} + x^{96} + x^{93} + x^{92} + x^{91} + x^{89} + x^{86} + x^{85} \\
&\quad + x^{84} + x^{79} + x^{75} + x^{71} + x^{67} + x^{66} + x^{63} + x^{62} + x^{61} + x^{59} + x^{56} \\
&\quad + x^{55} + x^{54} + x^{52} + x^{49} + x^{48} + x^{47} + x^{45} + x^{42} + x^{41} + x^{40} + x^{38} \\
&\quad + x^{35} + x^{33} + x^{31} + x^{30} + x^{29} + x^{28} + x^{27}, \\
p_6(x) &= x^{112} + x^{102} + x^{100} + x^{96} + x^{94} + x^{90} + x^{82} + x^{76} + x^{74} + x^{72} + x^{64} \\
&\quad + x^{62} + x^{60} + x^{52} + x^{50} + x^{48} + x^{44} + x^{40} + x^{38} + x^{36} + x^{34} + x^{28} \\
&\quad + x^{20} + x^{18}, \\
p_9(x) &= x^{118} + x^{114} + x^{113} + x^{106} + x^{102} + x^{101} + x^{98} + x^{93} + x^{90} + x^{89} \\
&\quad + x^{86} + x^{82} + x^{81} + x^{74} + x^{70} + x^{69} + x^{66} + x^{61} + x^{58} + x^{57} + x^{54} \\
&\quad + x^{50} + x^{49} + x^{42} + x^{37} + x^{33} + x^{29} + x^{25} + x^{22} + x^{21} + x^{18} + x^{13} \\
&\quad + x^{10} + x^{9}, \\
p_{12}(x) &= x^{124} + x^{116} + x^{112} + x^{108} + x^{104} + x^{100} + x^{92} + x^{88} + x^{84} + x^{76} \\
&\quad + x^{72} + x^{68} + x^{60} + x^{56} + x^{52} + x^{40} + x^{32} + x^{28} + x^{20} + x^{16} + x^{8} + 1,
\end{aligned}$$

and the initial terms are [0, 0, 0, 0, 1, 1, 0, 1, 0, 0, 1, 0, 0, 0, 0, 0].

For $\phi(M^o, 1, 1)$:

$$\begin{aligned}
p_0(x) &= x^{117} + x^{113} + x^{112} + x^{104} + x^{102} + x^{97} + x^{93} + x^{91} + x^{89} + x^{87} + x^{86} \\
&\quad + x^{83} + x^{82} + x^{81} + x^{80} + x^{73} + x^{72} + x^{71} + x^{70} + x^{67} + x^{63} + x^{62} \\
&\quad + x^{57} + x^{56} + x^{55} + x^{54} + x^{52} + x^{51} + x^{50} + x^{49} + x^{48} + x^{47} + x^{46} \\
&\quad + x^{45} + x^{44} + x^{43} + x^{42}, \\
p_3(x) &= x^{109} + x^{105} + x^{104} + x^{101} + x^{97} + x^{94} + x^{93} + x^{86} + x^{81} + x^{80} + x^{79} \\
&\quad + x^{77} + x^{76} + x^{75} + x^{74} + x^{73} + x^{72} + x^{71} + x^{68} + x^{67} + x^{66} + x^{63} \\
&\quad + x^{61} + x^{60} + x^{59} + x^{58} + x^{57} + x^{55} + x^{54} + x^{52} + x^{51} + x^{50} + x^{49} \\
&\quad + x^{47} + x^{45} + x^{44} + x^{43} + x^{42} + x^{41} + x^{37} + x^{33} + x^{32} + x^{31} + x^{30} \\
&\quad + x^{29} + x^{28} + x^{27} + x^{26}, \\
p_6(x) &= x^{113} + x^{108} + x^{102} + x^{101} + x^{100} + x^{93} + x^{92} + x^{89} + x^{88} + x^{87} + x^{85} \\
&\quad + x^{84} + x^{83} + x^{78} + x^{77} + x^{76} + x^{74} + x^{72} + x^{71} + x^{69} + x^{68} + x^{66} \\
&\quad + x^{64} + x^{58} + x^{56} + x^{52} + x^{50} + x^{49} + x^{48} + x^{47} + x^{45} + x^{44} + x^{43} \\
&\quad + x^{42} + x^{41} + x^{40} + x^{39} + x^{37} + x^{36} + x^{35} + x^{29} + x^{27} + x^{26} + x^{23} \\
&\quad + x^{22} + x^{21} + x^{20} + x^{17} + x^{16} + x^{15} + x^{14} + x^{5} + x + 1, \\
p_9(x) &= x^{109} + x^{104} + x^{100} + x^{96} + x^{93} + x^{92} + x^{77} + x^{72} + x^{68} + x^{64} + x^{61}
\end{aligned}$$

$$
\begin{aligned}
&+ x^{60} + x^{45} + x^{40} + x^{36} + x^{32} + x^{28} + x^{24} + x^{20} + x^{16} + x^{13} + x^{12},\\
p_{12}(x) &= x^{117} + x^{112} + x^{109} + x^{108} + x^{97} + x^{93} + x^{92} + x^{81} + x^{77} + x^{76} + x^{65}\\
&+ x^{61} + x^{60} + x^{49} + x^{45} + x^{44} + x^{37} + x^{33} + x^{32} + x^{21} + x^{16} + x^{13}\\
&+ x^{12} + x^{5} + x + 1,
\end{aligned}
$$

and the initial terms are [0, 0, 0, 0, 0, 0, 0, 1, 1, 0, 0, 1, 0, 1, 0, 0].

For $\phi(W^o, 0, 0)$:

$$
\begin{aligned}
p_0(x) &= x^{117} + x^{113} + x^{112} + x^{109} + x^{105} + x^{102} + x^{95} + x^{92} + x^{91} + x^{90}\\
&+ x^{88} + x^{86} + x^{85} + x^{84} + x^{82} + x^{81} + x^{80} + x^{78} + x^{76} + x^{74} + x^{73}\\
&+ x^{71} + x^{70} + x^{68} + x^{65} + x^{64} + x^{63} + x^{61} + x^{59} + x^{58} + x^{51} + x^{47}\\
&+ x^{40} + x^{39} + x^{38} + x^{37} + x^{36},\\
p_3(x) &= x^{109} + x^{105} + x^{104} + x^{96} + x^{94} + x^{93} + x^{89} + x^{87} + x^{86} + x^{85} + x^{84}\\
&+ x^{82} + x^{80} + x^{79} + x^{78} + x^{77} + x^{75} + x^{73} + x^{71} + x^{70} + x^{67} + x^{64}\\
&+ x^{63} + x^{62} + x^{59} + x^{55} + x^{53} + x^{51} + x^{49} + x^{46} + x^{45} + x^{44} + x^{43}\\
&+ x^{42} + x^{39} + x^{36} + x^{34} + x^{33} + x^{32} + x^{28} + x^{27} + x^{26} + x^{25} + x^{24},\\
p_6(x) &= x^{113} + x^{109} + x^{108} + x^{105} + x^{104} + x^{102} + x^{100} + x^{96} + x^{95} + x^{93}\\
&+ x^{90} + x^{89} + x^{86} + x^{85} + x^{83} + x^{80} + x^{79} + x^{78} + x^{77} + x^{75} + x^{71}\\
&+ x^{69} + x^{66} + x^{65} + x^{58} + x^{57} + x^{56} + x^{55} + x^{47} + x^{46} + x^{44} + x^{43}\\
&+ x^{41} + x^{38} + x^{37} + x^{32} + x^{30} + x^{28} + x^{22} + x^{20} + x^{19} + x^{18} + x^{17}\\
&+ x^{15} + x^{14} + x^{13} + x^{12} + x^{5} + x + 1,\\
p_9(x) &= x^{109} + x^{104} + x^{100} + x^{96} + x^{93} + x^{92} + x^{77} + x^{72} + x^{68} + x^{64} + x^{61}\\
&+ x^{60} + x^{45} + x^{40} + x^{36} + x^{32} + x^{28} + x^{24} + x^{20} + x^{16} + x^{13} + x^{12},\\
p_{12}(x) &= x^{117} + x^{112} + x^{109} + x^{108} + x^{97} + x^{93} + x^{92} + x^{81} + x^{77} + x^{76} + x^{65}\\
&+ x^{61} + x^{60} + x^{49} + x^{45} + x^{44} + x^{37} + x^{33} + x^{32} + x^{21} + x^{16} + x^{13}\\
&+ x^{12} + x^{5} + x + 1,
\end{aligned}
$$

and the initial terms are [1, 0, 0, 0, 0, 0, 1, 1, 0, 0, 1, 1, 1, 1, 1, 0].

For $\phi(W^o, 0, 1)$:

$$
\begin{aligned}
p_0(x) &= x^{124} + x^{118} + x^{115} + x^{113} + x^{106} + x^{104} + x^{103} + x^{100} + x^{98} + x^{97}\\
&+ x^{96} + x^{95} + x^{93} + x^{91} + x^{87} + x^{86} + x^{84} + x^{83} + x^{82} + x^{80} + x^{79}\\
&+ x^{75} + x^{72} + x^{70} + x^{67} + x^{66} + x^{65} + x^{63} + x^{62} + x^{60} + x^{56} + x^{55}\\
&+ x^{53} + x^{51} + x^{46} + x^{44} + x^{43} + x^{41} + x^{39},\\
p_3(x) &= x^{106} + x^{102} + x^{101} + x^{98} + x^{96} + x^{93} + x^{92} + x^{91} + x^{89} + x^{86} + x^{85}\\
&+ x^{84} + x^{79} + x^{75} + x^{71} + x^{67} + x^{66} + x^{63} + x^{62} + x^{61} + x^{59} + x^{56}\\
&+ x^{55} + x^{54} + x^{52} + x^{49} + x^{48} + x^{47} + x^{45} + x^{42} + x^{41} + x^{40} + x^{38}\\
&+ x^{35} + x^{33} + x^{31} + x^{30} + x^{29} + x^{28} + x^{27},\\
p_6(x) &= x^{112} + x^{102} + x^{100} + x^{96} + x^{94} + x^{90} + x^{82} + x^{76} + x^{74} + x^{72} + x^{64}
\end{aligned}
$$

$$
\begin{aligned}
&+ x^{62} + x^{60} + x^{52} + x^{50} + x^{48} + x^{44} + x^{40} + x^{38} + x^{36} + x^{34} + x^{28}\\
&+ x^{20} + x^{18},\\
p_9(x) &= x^{118} + x^{114} + x^{113} + x^{106} + x^{102} + x^{101} + x^{98} + x^{93} + x^{90} + x^{89}\\
&+ x^{86} + x^{82} + x^{81} + x^{74} + x^{70} + x^{69} + x^{66} + x^{61} + x^{58} + x^{57} + x^{54}\\
&+ x^{50} + x^{49} + x^{42} + x^{37} + x^{33} + x^{29} + x^{25} + x^{22} + x^{21} + x^{18} + x^{13}\\
&+ x^{10} + x^{9},\\
p_{12}(x) &= x^{124} + x^{116} + x^{112} + x^{108} + x^{104} + x^{100} + x^{92} + x^{88} + x^{84} + x^{76}\\
&+ x^{72} + x^{68} + x^{60} + x^{56} + x^{52} + x^{40} + x^{32} + x^{28} + x^{20} + x^{16} + x^{8} + 1,
\end{aligned}
$$

and the initial terms are [0, 0, 0, 0, 1, 1, 0, 1, 0, 0, 1, 0, 0, 0, 0, 0].

For $\phi(W^o, 1, 0)$:

$$
\begin{aligned}
p_0(x) &= x^{120} + x^{114} + x^{112} + x^{111} + x^{109} + x^{108} + x^{106} + x^{104} + x^{103} + x^{102}\\
&+ x^{101} + x^{99} + x^{98} + x^{94} + x^{93} + x^{92} + x^{91} + x^{88} + x^{87} + x^{85} + x^{83}\\
&+ x^{79} + x^{78} + x^{73} + x^{70} + x^{67} + x^{64} + x^{63} + x^{62} + x^{60} + x^{59} + x^{57}\\
&+ x^{54} + x^{53} + x^{52} + x^{49} + x^{48} + x^{47} + x^{45} + x^{41} + x^{39},\\
p_3(x) &= x^{102} + x^{98} + x^{97} + x^{92} + x^{90} + x^{88} + x^{87} + x^{86} + x^{85} + x^{84} + x^{79}\\
&+ x^{75} + x^{71} + x^{67} + x^{63} + x^{62} + x^{59} + x^{58} + x^{57} + x^{55} + x^{54} + x^{52}\\
&+ x^{51} + x^{49} + x^{48} + x^{45} + x^{43} + x^{41} + x^{40} + x^{39} + x^{38} + x^{37} + x^{34}\\
&+ x^{32} + x^{30} + x^{29} + x^{28} + x^{27},\\
p_6(x) &= x^{108} + x^{100} + x^{98} + x^{96} + x^{92} + x^{86} + x^{82} + x^{80} + x^{78} + x^{76} + x^{74}\\
&+ x^{68} + x^{58} + x^{56} + x^{52} + x^{50} + x^{48} + x^{46} + x^{32} + x^{28} + x^{24} + x^{22}\\
&+ x^{20} + x^{18},\\
p_9(x) &= x^{114} + x^{110} + x^{109} + x^{106} + x^{101} + x^{98} + x^{97} + x^{94} + x^{90} + x^{89} + x^{82}\\
&+ x^{78} + x^{77} + x^{74} + x^{69} + x^{66} + x^{65} + x^{62} + x^{58} + x^{57} + x^{50} + x^{46}\\
&+ x^{45} + x^{42} + x^{37} + x^{33} + x^{29} + x^{25} + x^{21} + x^{18} + x^{17} + x^{14} + x^{10}\\
&+ x^{9},\\
p_{12}(x) &= x^{120} + x^{108} + x^{100} + x^{96} + x^{92} + x^{84} + x^{80} + x^{76} + x^{68} + x^{64} + x^{60}\\
&+ x^{52} + x^{48} + x^{44} + x^{40} + x^{36} + x^{32} + x^{24} + x^{12} + x^{8} + x^{4} + 1,
\end{aligned}
$$

and the initial terms are [0, 0, 0, 1, 0, 0, 1, 0, 0, 0, 0, 1, 0, 1, 1, 1].

For $\phi(W^o, 1, 1)$:

$$
\begin{aligned}
p_0(x) &= x^{117} + x^{113} + x^{112} + x^{104} + x^{102} + x^{97} + x^{93} + x^{91} + x^{89} + x^{87} + x^{86}\\
&+ x^{83} + x^{82} + x^{81} + x^{80} + x^{73} + x^{72} + x^{71} + x^{70} + x^{67} + x^{63} + x^{62}\\
&+ x^{57} + x^{56} + x^{55} + x^{54} + x^{52} + x^{51} + x^{50} + x^{49} + x^{48} + x^{47} + x^{46}\\
&+ x^{45} + x^{44} + x^{43} + x^{42},\\
p_3(x) &= x^{109} + x^{105} + x^{104} + x^{101} + x^{97} + x^{94} + x^{93} + x^{86} + x^{81} + x^{80} + x^{79}\\
&+ x^{77} + x^{76} + x^{75} + x^{74} + x^{73} + x^{72} + x^{71} + x^{68} + x^{67} + x^{66} + x^{63}
\end{aligned}
$$

$$
\begin{aligned}
&+ x^{61} + x^{60} + x^{59} + x^{58} + x^{57} + x^{55} + x^{54} + x^{52} + x^{51} + x^{50} + x^{49}\\
&+ x^{47} + x^{45} + x^{44} + x^{43} + x^{42} + x^{41} + x^{37} + x^{33} + x^{32} + x^{31} + x^{30}\\
&+ x^{29} + x^{28} + x^{27} + x^{26},\\
p_6(x) &= x^{113} + x^{108} + x^{102} + x^{101} + x^{100} + x^{93} + x^{92} + x^{89} + x^{88} + x^{87} + x^{85}\\
&+ x^{84} + x^{83} + x^{78} + x^{77} + x^{76} + x^{74} + x^{72} + x^{71} + x^{69} + x^{68} + x^{66}\\
&+ x^{64} + x^{58} + x^{56} + x^{52} + x^{50} + x^{49} + x^{48} + x^{47} + x^{45} + x^{44} + x^{43}\\
&+ x^{42} + x^{41} + x^{40} + x^{39} + x^{37} + x^{36} + x^{35} + x^{29} + x^{27} + x^{26} + x^{23}\\
&+ x^{22} + x^{21} + x^{20} + x^{17} + x^{16} + x^{15} + x^{14} + x^{5} + x + 1,\\
p_9(x) &= x^{109} + x^{104} + x^{100} + x^{96} + x^{93} + x^{92} + x^{77} + x^{72} + x^{68} + x^{64} + x^{61}\\
&+ x^{60} + x^{45} + x^{40} + x^{36} + x^{32} + x^{28} + x^{24} + x^{20} + x^{16} + x^{13} + x^{12},\\
p_{12}(x) &= x^{117} + x^{112} + x^{109} + x^{108} + x^{97} + x^{93} + x^{92} + x^{81} + x^{77} + x^{76} + x^{65}\\
&+ x^{61} + x^{60} + x^{49} + x^{45} + x^{44} + x^{37} + x^{33} + x^{32} + x^{21} + x^{16} + x^{13}\\
&+ x^{12} + x^{5} + x + 1,
\end{aligned}
$$

and the initial terms are [0, 0, 0, 0, 0, 0, 0, 1, 1, 0, 0, 1, 0, 1, 0, 0].

Below is the transition function and output function of an 2-automaton that generates $T = M^o_{0,0}$:

Transition function $(n, j) \mapsto \delta(n, j)$ $(\Lambda(n) := [\delta(n, 0), \delta(n, 1)])$:

n	$\Lambda(n)$	n	$\Lambda(n)$	n	$\Lambda(n)$	n	$\Lambda(n)$
0	[1, 2]	855	[1431, 1432]	1710	[1258, 96]	2565	[550, 1924]
1	[3, 4]	856	[720, 1433]	1711	[83, 1246]	2566	[3136, 1461]
2	[5, 6]	857	[1434, 1435]	1712	[1390, 870]	2567	[3137, 1800]
3	[7, 8]	858	[1436, 1437]	1713	[244, 395]	2568	[159, 3138]
4	[9, 10]	859	[1438, 780]	1714	[2521, 2522]	2569	[3139, 2996]
5	[11, 12]	860	[1439, 1440]	1715	[1137, 2523]	2570	[3140, 3141]
6	[13, 14]	861	[1441, 1442]	1716	[1139, 1104]	2571	[3142, 3143]
7	[15, 16]	862	[1443, 1444]	1717	[384, 272]	2572	[3144, 1885]
8	[17, 18]	863	[1445, 1446]	1718	[2524, 2525]	2573	[3145, 3146]
9	[19, 20]	864	[1447, 1448]	1719	[882, 1068]	2574	[3119, 1952]
10	[21, 22]	865	[1449, 1450]	1720	[2248, 317]	2575	[3147, 1876]
11	[23, 24]	866	[1451, 1452]	1721	[2526, 2527]	2576	[2919, 3148]
12	[25, 26]	867	[1428, 1453]	1722	[2528, 2529]	2577	[136, 2155]
13	[27, 28]	868	[1454, 1455]	1723	[1003, 2530]	2578	[34, 3149]
14	[29, 30]	869	[1456, 810]	1724	[985, 411]	2579	[2022, 3150]
15	[31, 32]	870	[1457, 1458]	1725	[2531, 2532]	2580	[1421, 1492]
16	[33, 34]	871	[1459, 1460]	1726	[1018, 2533]	2581	[1590, 2978]
17	[35, 36]	872	[1461, 1462]	1727	[2534, 2535]	2582	[3151, 2077]
18	[37, 38]	873	[1463, 1464]	1728	[1032, 69]	2583	[3025, 816]
19	[38, 39]	874	[599, 1465]	1729	[2513, 2536]	2584	[2999, 3064]
20	[40, 41]	875	[1466, 1467]	1730	[1336, 2270]	2585	[777, 3152]
21	[42, 43]	876	[1468, 1469]	1731	[2537, 2276]	2586	[517, 2085]

22	[44, 45]	877	[1470, 1471]	1732	[2538, 1299]	2587	[3153, 3154]
23	[46, 47]	878	[1472, 1473]	1733	[2536, 2274]	2588	[2, 3155]
24	[48, 49]	879	[1474, 1475]	1734	[2539, 2334]	2589	[3156, 2228]
25	[50, 51]	880	[1476, 156]	1735	[2540, 2541]	2590	[3157, 3158]
26	[52, 53]	881	[1477, 768]	1736	[2542, 2467]	2591	[3159, 149]
27	[54, 55]	882	[1478, 1479]	1737	[446, 869]	2592	[3160, 3161]
28	[56, 57]	883	[715, 1480]	1738	[1026, 2543]	2593	[1903, 1866]
29	[58, 59]	884	[1481, 1482]	1739	[2544, 2545]	2594	[1594, 215]
30	[60, 61]	885	[1483, 1484]	1740	[343, 1247]	2595	[3162, 3163]
31	[62, 63]	886	[1485, 518]	1741	[1272, 92]	2596	[3164, 3165]
32	[64, 65]	887	[1486, 1487]	1742	[916, 2308]	2597	[3166, 3167]
33	[66, 67]	888	[581, 1488]	1743	[2309, 2517]	2598	[3168, 817]
34	[68, 69]	889	[1489, 1490]	1744	[67, 109]	2599	[3169, 668]
35	[70, 71]	890	[1491, 798]	1745	[2546, 312]	2600	[2966, 3170]
36	[72, 73]	891	[1492, 1493]	1746	[1162, 68]	2601	[3171, 3172]
37	[74, 75]	892	[579, 1459]	1747	[2547, 1243]	2602	[483, 814]
38	[76, 77]	893	[1494, 174]	1748	[2251, 2548]	2603	[2105, 3173]
39	[75, 78]	894	[1495, 1496]	1749	[971, 2549]	2604	[3174, 3175]
40	[79, 80]	895	[1497, 1498]	1750	[253, 2550]	2605	[3176, 3133]
41	[81, 82]	896	[1499, 1500]	1751	[2278, 1347]	2606	[3177, 3178]
42	[83, 84]	897	[533, 1501]	1752	[2551, 2552]	2607	[1430, 571]
43	[85, 86]	898	[1502, 1503]	1753	[1371, 2553]	2608	[3179, 3180]
44	[87, 88]	899	[764, 1504]	1754	[2554, 455]	2609	[481, 1439]
45	[89, 90]	900	[1505, 1506]	1755	[2555, 1373]	2610	[2986, 2911]
46	[91, 92]	901	[511, 1507]	1756	[992, 879]	2611	[3037, 2861]
47	[93, 94]	902	[1508, 1509]	1757	[2556, 2459]	2612	[1501, 1614]
48	[95, 96]	903	[842, 1510]	1758	[2557, 2558]	2613	[1696, 1945]
49	[97, 98]	904	[1511, 1512]	1759	[383, 258]	2614	[2823, 1940]
50	[99, 100]	905	[1513, 1514]	1760	[2559, 2560]	2615	[1581, 1906]
51	[101, 102]	906	[1515, 1516]	1761	[2561, 2365]	2616	[3181, 2126]
52	[103, 104]	907	[1517, 1518]	1762	[2562, 2563]	2617	[2142, 3160]
53	[105, 106]	908	[1519, 1520]	1763	[2564, 2439]	2618	[3182, 1938]
54	[107, 108]	909	[1521, 1522]	1764	[2565, 1172]	2619	[3183, 3184]
55	[109, 110]	910	[1523, 1524]	1765	[1411, 442]	2620	[3185, 1689]
56	[111, 112]	911	[1525, 1526]	1766	[2324, 913]	2621	[3186, 2079]
57	[113, 114]	912	[1527, 746]	1767	[1127, 2566]	2622	[2860, 458]
58	[115, 116]	913	[1528, 1529]	1768	[2546, 2567]	2623	[2847, 3187]
59	[117, 118]	914	[1530, 1531]	1769	[1220, 2472]	2624	[226, 1928]
60	[119, 120]	915	[1532, 1533]	1770	[1236, 2277]	2625	[3050, 3188]
61	[121, 122]	916	[762, 1534]	1771	[1375, 2568]	2626	[1627, 3189]
62	[123, 124]	917	[1535, 1536]	1772	[2569, 2570]	2627	[2185, 578]
63	[125, 126]	918	[1537, 1538]	1773	[2342, 1099]	2628	[548, 1620]
64	[127, 128]	919	[1539, 1540]	1774	[1307, 249]	2629	[3190, 3191]
65	[129, 130]	920	[1541, 674]	1775	[950, 1345]	2630	[3192, 2081]

66	[131, 132]	921	[1542, 1543]	1776	[1120, 2571]	2631	[1424, 1550]
67	[133, 134]	922	[1544, 1545]	1777	[2572, 994]	2632	[3193, 1776]
68	[135, 136]	923	[1546, 213]	1778	[2408, 2425]	2633	[1543, 3179]
69	[137, 138]	924	[1547, 1548]	1779	[2573, 1269]	2634	[3194, 3156]
70	[139, 140]	925	[1549, 1537]	1780	[1064, 2376]	2635	[1533, 740]
71	[141, 142]	926	[1550, 1551]	1781	[2574, 376]	2636	[3195, 2066]
72	[143, 144]	927	[1552, 1553]	1782	[1034, 2362]	2637	[3196, 3197]
73	[145, 146]	928	[134, 1554]	1783	[2473, 1296]	2638	[3198, 2037]
74	[147, 148]	929	[1555, 1556]	1784	[1252, 2575]	2639	[3199, 3200]
75	[149, 150]	930	[1557, 1558]	1785	[2566, 406]	2640	[3201, 2053]
76	[151, 152]	931	[1559, 1560]	1786	[323, 1278]	2641	[1753, 3202]
77	[153, 154]	932	[1490, 1561]	1787	[1163, 2259]	2642	[1725, 2050]
78	[148, 155]	933	[1520, 1562]	1788	[2576, 2577]	2643	[2984, 3015]
79	[156, 157]	934	[1563, 141]	1789	[1220, 2578]	2644	[2028, 3203]
80	[158, 159]	935	[1564, 1565]	1790	[2579, 2580]	2645	[1680, 2149]
81	[160, 161]	936	[1566, 1567]	1791	[1325, 2581]	2646	[3204, 2871]
82	[162, 163]	937	[1568, 1569]	1792	[2582, 2453]	2647	[188, 3205]
83	[164, 165]	938	[1570, 812]	1793	[1110, 1406]	2648	[1798, 1658]
84	[166, 167]	939	[1571, 538]	1794	[2382, 2583]	2649	[3206, 3071]
85	[168, 169]	940	[1572, 1573]	1795	[951, 323]	2650	[781, 1418]
86	[170, 171]	941	[1574, 1438]	1796	[1386, 2481]	2651	[2851, 3118]
87	[172, 173]	942	[1575, 1576]	1797	[2584, 1161]	2652	[1524, 2128]
88	[174, 175]	943	[1577, 1578]	1798	[895, 2262]	2653	[3055, 1555]
89	[176, 177]	944	[1579, 1580]	1799	[1174, 2239]	2654	[2877, 1611]
90	[178, 179]	945	[539, 1581]	1800	[1376, 2585]	2655	[595, 1703]
91	[180, 125]	946	[1582, 1583]	1801	[2586, 2587]	2656	[583, 2906]
92	[181, 182]	947	[1584, 1585]	1802	[1201, 1254]	2657	[1923, 3207]
93	[183, 184]	948	[1444, 1586]	1803	[2441, 985]	2658	[1780, 3208]
94	[185, 186]	949	[1587, 1588]	1804	[1234, 2588]	2659	[3014, 680]
95	[187, 188]	950	[1589, 1590]	1805	[389, 2589]	2660	[3209, 1674]
96	[189, 190]	951	[1591, 569]	1806	[2429, 1230]	2661	[2867, 2976]
97	[191, 192]	952	[779, 1592]	1807	[2590, 2591]	2662	[2890, 187]
98	[193, 194]	953	[1593, 1594]	1808	[980, 1207]	2663	[3210, 1656]
99	[195, 196]	954	[1595, 1596]	1809	[2325, 886]	2664	[3211, 3212]
100	[197, 198]	955	[1597, 523]	1810	[1231, 905]	2665	[3172, 3033]
101	[199, 200]	956	[1598, 598]	1811	[1302, 2592]	2666	[3213, 3214]
102	[201, 202]	957	[1599, 1600]	1812	[2593, 1309]	2667	[3215, 3216]
103	[203, 204]	958	[1601, 1519]	1813	[2584, 1227]	2668	[10, 3030]
104	[205, 206]	959	[1602, 505]	1814	[2594, 105]	2669	[3018, 3217]
105	[207, 208]	960	[521, 1603]	1815	[1117, 1162]	2670	[515, 3218]
106	[209, 210]	961	[1604, 748]	1816	[2595, 2596]	2671	[3219, 773]
107	[211, 212]	962	[1605, 1606]	1817	[1205, 1379]	2672	[1498, 2855]
108	[213, 214]	963	[1607, 1608]	1818	[2369, 2382]	2673	[3035, 3220]
109	[215, 216]	964	[1609, 1610]	1819	[865, 2377]	2674	[2119, 3074]

110	[217, 218]	965	[1611, 1612]	1820	[1306, 278]	2675	[3221, 1517]
111	[219, 220]	966	[242, 613]	1821	[2597, 2598]	2676	[2921, 1778]
112	[221, 222]	967	[210, 1613]	1822	[2448, 2599]	2677	[2182, 840]
113	[223, 224]	968	[1614, 1549]	1823	[2389, 2544]	2678	[3222, 2981]
114	[225, 226]	969	[59, 1615]	1824	[2390, 2600]	2679	[2827, 3223]
115	[227, 228]	970	[1616, 1617]	1825	[1226, 2358]	2680	[2051, 3219]
116	[229, 230]	971	[1618, 1619]	1826	[2601, 2281]	2681	[711, 3224]
117	[231, 232]	972	[837, 1478]	1827	[2415, 1354]	2682	[808, 1505]
118	[233, 234]	973	[1620, 1621]	1828	[2370, 2583]	2683	[1849, 1790]
119	[235, 236]	974	[1622, 139]	1829	[2602, 273]	2684	[1785, 510]
120	[237, 238]	975	[1623, 1624]	1830	[2603, 2604]	2685	[2895, 3225]
121	[239, 240]	976	[1625, 1626]	1831	[2605, 2606]	2686	[1629, 696]
122	[241, 242]	977	[1583, 1627]	1832	[2607, 1290]	2687	[1934, 2893]
123	[243, 244]	978	[1628, 1629]	1833	[1077, 27]	2688	[3226, 3135]
124	[245, 246]	979	[1458, 50]	1834	[2246, 917]	2689	[3227, 3228]
125	[247, 248]	980	[1630, 1631]	1835	[1099, 2576]	2690	[541, 845]
126	[249, 250]	981	[1632, 1466]	1836	[912, 2608]	2691	[1793, 3229]
127	[251, 252]	982	[1633, 1634]	1837	[850, 2609]	2692	[3230, 3063]
128	[253, 254]	983	[825, 1635]	1838	[329, 2610]	2693	[3099, 1672]
129	[255, 256]	984	[1636, 219]	1839	[2470, 2611]	2694	[3138, 3231]
130	[257, 258]	985	[1637, 221]	1840	[1330, 2612]	2695	[2909, 3232]
131	[259, 87]	986	[1638, 1639]	1841	[2521, 2589]	2696	[150, 3206]
132	[260, 261]	987	[1640, 1641]	1842	[2289, 4]	2697	[3233, 1685]
133	[262, 263]	988	[1642, 1643]	1843	[2332, 93]	2698	[3234, 3235]
134	[264, 265]	989	[1644, 1645]	1844	[2404, 987]	2699	[709, 3003]
135	[266, 267]	990	[1646, 33]	1845	[1097, 2358]	2700	[3008, 1835]
136	[268, 269]	991	[1647, 1648]	1846	[2613, 937]	2701	[2956, 2208]
137	[270, 271]	992	[1649, 1476]	1847	[1196, 2614]	2702	[2024, 1539]
138	[272, 273]	993	[1650, 1651]	1848	[2559, 107]	2703	[3236, 3237]
139	[274, 275]	994	[1652, 1653]	1849	[950, 1325]	2704	[3238, 3222]
140	[276, 277]	995	[1654, 1655]	1850	[1313, 882]	2705	[1554, 3239]
141	[278, 279]	996	[1656, 1657]	1851	[79, 893]	2706	[3240, 540]
142	[280, 281]	997	[1658, 60]	1852	[2615, 1015]	2707	[3241, 11]
143	[282, 283]	998	[1659, 1660]	1853	[2616, 2592]	2708	[3242, 3243]
144	[284, 285]	999	[1661, 1547]	1854	[1169, 2272]	2709	[3244, 1757]
145	[286, 284]	1000	[1662, 1663]	1855	[1128, 2326]	2710	[2977, 2953]
146	[287, 288]	1001	[1664, 1665]	1856	[2617, 1302]	2711	[3245, 3246]
147	[289, 290]	1002	[1666, 1667]	1857	[1354, 2363]	2712	[3247, 3070]
148	[291, 292]	1003	[1668, 1669]	1858	[2618, 2619]	2713	[3248, 1605]
149	[293, 294]	1004	[1670, 1671]	1859	[1308, 30]	2714	[3249, 2942]
150	[295, 296]	1005	[1672, 1673]	1860	[2424, 2620]	2715	[3250, 3251]
151	[297, 298]	1006	[1674, 487]	1861	[2621, 1288]	2716	[3129, 3169]
152	[299, 300]	1007	[1675, 1676]	1862	[2286, 2622]	2717	[789, 3252]
153	[301, 302]	1008	[1677, 1678]	1863	[436, 1333]	2718	[1789, 2821]

154	[303, 304]	1009	[1679, 1680]	1864	[2623, 1328]	2719	[3253, 559]
155	[290, 305]	1010	[1681, 1477]	1865	[286, 2495]	2720	[3254, 482]
156	[306, 16]	1011	[1682, 459]	1866	[2624, 2625]	2721	[3255, 3256]
157	[307, 308]	1012	[1683, 1684]	1867	[1334, 2498]	2722	[220, 2965]
158	[309, 310]	1013	[1685, 1686]	1868	[1100, 2246]	2723	[646, 3257]
159	[311, 312]	1014	[1687, 1688]	1869	[2253, 76]	2724	[1560, 2841]
160	[313, 314]	1015	[1689, 1690]	1870	[2327, 254]	2725	[632, 1715]
161	[315, 316]	1016	[1691, 491]	1871	[1114, 1261]	2726	[3258, 547]
162	[317, 318]	1017	[1692, 1693]	1872	[1019, 2626]	2727	[2840, 3259]
163	[319, 320]	1018	[1694, 1692]	1873	[2507, 1371]	2728	[3094, 3006]
164	[321, 322]	1019	[1695, 1696]	1874	[2427, 454]	2729	[1978, 3073]
165	[323, 324]	1020	[1697, 1698]	1875	[2627, 17]	2730	[3235, 2951]
166	[325, 326]	1021	[1699, 1700]	1876	[2628, 2629]	2731	[3260, 1855]
167	[327, 328]	1022	[1701, 1702]	1877	[2630, 2607]	2732	[1931, 2884]
168	[329, 330]	1023	[1703, 1704]	1878	[2631, 848]	2733	[2069, 1911]
169	[331, 332]	1024	[1705, 594]	1879	[2538, 430]	2734	[3059, 2188]
170	[333, 334]	1025	[1706, 1707]	1880	[2632, 2318]	2735	[2020, 3126]
171	[335, 323]	1026	[1708, 1709]	1881	[894, 2271]	2736	[3062, 3142]
172	[336, 337]	1027	[1585, 1710]	1882	[348, 1217]	2737	[1709, 3261]
173	[338, 339]	1028	[1711, 1712]	1883	[1288, 2306]	2738	[694, 2985]
174	[340, 341]	1029	[1713, 1714]	1884	[2633, 2246]	2739	[186, 207]
175	[342, 343]	1030	[1715, 1716]	1885	[2634, 2521]	2740	[3262, 2876]
176	[344, 345]	1031	[1717, 137]	1886	[2476, 2321]	2741	[1839, 3263]
177	[346, 347]	1032	[1718, 1719]	1887	[2635, 1218]	2742	[2945, 574]
178	[348, 349]	1033	[1720, 1456]	1888	[1182, 29]	2743	[3053, 3264]
179	[350, 351]	1034	[1721, 1722]	1889	[1351, 2636]	2744	[152, 3265]
180	[5, 249]	1035	[1723, 1724]	1890	[983, 2398]	2745	[1586, 691]
181	[352, 25]	1036	[660, 1725]	1891	[2622, 2390]	2746	[3266, 199]
182	[353, 354]	1037	[1726, 1727]	1892	[2637, 2638]	2747	[3267, 143]
183	[24, 355]	1038	[1728, 1729]	1893	[2248, 1070]	2748	[2932, 624]
184	[356, 357]	1039	[1730, 1731]	1894	[1121, 2639]	2749	[3268, 1559]
185	[358, 359]	1040	[1732, 170]	1895	[2640, 1030]	2750	[3269, 836]
186	[360, 361]	1041	[1733, 1734]	1896	[2641, 2642]	2751	[3146, 3270]
187	[362, 363]	1042	[1735, 542]	1897	[1217, 2454]	2752	[3180, 3271]
188	[364, 365]	1043	[1736, 1737]	1898	[2643, 2644]	2753	[3272, 2898]
189	[366, 367]	1044	[560, 1738]	1899	[2645, 2646]	2754	[3273, 3274]
190	[368, 369]	1045	[1739, 1431]	1900	[2337, 993]	2755	[2173, 3079]
191	[370, 371]	1046	[717, 1740]	1901	[2647, 2648]	2756	[3004, 1900]
192	[372, 63]	1047	[1741, 1742]	1902	[2480, 2624]	2757	[722, 3275]
193	[373, 374]	1048	[1653, 1743]	1903	[2649, 1334]	2758	[697, 718]
194	[375, 376]	1049	[1744, 469]	1904	[76, 2418]	2759	[2946, 3276]
195	[377, 378]	1050	[1745, 565]	1905	[1311, 441]	2760	[3277, 1572]
196	[379, 380]	1051	[1746, 1747]	1906	[2384, 2532]	2761	[3232, 1640]
197	[381, 382]	1052	[1748, 1749]	1907	[965, 2650]	2762	[218, 3278]

198	[383, 384]	1053	[1750, 1751]	1908	[2285, 2651]	2763	[675, 2831]
199	[385, 386]	1054	[1752, 1753]	1909	[2300, 1003]	2764	[2019, 2217]
200	[104, 387]	1055	[1754, 1755]	1910	[911, 2652]	2765	[745, 3279]
201	[388, 389]	1056	[1464, 1756]	1911	[2613, 368]	2766	[799, 3280]
202	[390, 391]	1057	[1757, 1758]	1912	[854, 1085]	2767	[3281, 225]
203	[392, 393]	1058	[171, 164]	1913	[2653, 339]	2768	[204, 1568]
204	[394, 395]	1059	[1759, 1760]	1914	[1164, 2654]	2769	[3282, 2219]
205	[396, 397]	1060	[1761, 1486]	1915	[2386, 22]	2770	[3283, 3195]
206	[398, 399]	1061	[1762, 1763]	1916	[2636, 103]	2771	[3284, 1523]
207	[400, 401]	1062	[1764, 1765]	1917	[2423, 423]	2772	[2872, 3285]
208	[402, 403]	1063	[1766, 775]	1918	[2655, 448]	2773	[41, 1870]
209	[404, 405]	1064	[1767, 1768]	1919	[111, 412]	2774	[3265, 1926]
210	[406, 88]	1065	[1769, 1770]	1920	[1125, 1305]	2775	[3106, 3069]
211	[407, 408]	1066	[1771, 1630]	1921	[2358, 2656]	2776	[3175, 2826]
212	[409, 410]	1067	[1772, 1773]	1922	[2657, 2658]	2777	[2926, 1815]
213	[411, 412]	1068	[1774, 1775]	1923	[2659, 2660]	2778	[1580, 2091]
214	[413, 86]	1069	[1776, 1777]	1924	[2661, 983]	2779	[3224, 3286]
215	[414, 415]	1070	[1778, 1779]	1925	[1011, 881]	2780	[2193, 3287]
216	[416, 417]	1071	[1522, 1780]	1926	[2662, 1257]	2781	[615, 3288]
217	[418, 335]	1072	[1651, 1781]	1927	[382, 1044]	2782	[3143, 133]
218	[93, 419]	1073	[1782, 1783]	1928	[2663, 2664]	2783	[1603, 1602]
219	[420, 421]	1074	[1784, 1785]	1929	[2665, 2542]	2784	[3289, 2881]
220	[422, 103]	1075	[1786, 1787]	1930	[2539, 2666]	2785	[3067, 3290]
221	[102, 396]	1076	[753, 1788]	1931	[2667, 1363]	2786	[462, 1682]
222	[423, 329]	1077	[1660, 723]	1932	[1388, 1190]	2787	[2125, 3215]
223	[424, 425]	1078	[690, 1789]	1933	[17, 78]	2788	[1901, 1697]
224	[426, 427]	1079	[1790, 1791]	1934	[945, 2488]	2789	[1626, 3060]
225	[428, 429]	1080	[813, 790]	1935	[2495, 285]	2790	[3291, 1587]
226	[430, 431]	1081	[1792, 1793]	1936	[2273, 2668]	2791	[3292, 3293]
227	[432, 433]	1082	[1794, 1795]	1937	[873, 2669]	2792	[2203, 3077]
228	[434, 435]	1083	[1796, 1699]	1938	[1064, 865]	2793	[1538, 3294]
229	[436, 437]	1084	[1797, 1798]	1939	[2670, 2671]	2794	[3295, 1661]
230	[438, 439]	1085	[1799, 1420]	1940	[2672, 2673]	2795	[636, 1701]
231	[440, 441]	1086	[1800, 1801]	1941	[2654, 2674]	2796	[1929, 2993]
232	[442, 313]	1087	[1802, 1803]	1942	[1139, 1042]	2797	[3296, 3107]
233	[443, 444]	1088	[1804, 1805]	1943	[2675, 906]	2798	[3154, 227]
234	[445, 117]	1089	[1806, 1807]	1944	[2676, 956]	2799	[1844, 3057]
235	[382, 326]	1090	[1808, 1809]	1945	[2677, 2678]	2800	[3297, 1720]
236	[446, 447]	1091	[1810, 1811]	1946	[1205, 2679]	2801	[3298, 3299]
237	[448, 268]	1092	[1812, 1813]	1947	[2641, 2680]	2802	[3081, 3112]
238	[449, 450]	1093	[589, 1814]	1948	[380, 2681]	2803	[1676, 2108]
239	[85, 451]	1094	[1815, 1816]	1949	[2264, 2682]	2804	[3300, 3233]
240	[19, 452]	1095	[1817, 1818]	1950	[1398, 2683]	2805	[1479, 3145]
241	[453, 454]	1096	[1819, 1474]	1951	[2645, 1055]	2806	[2233, 3128]

242	[455, 456]	1097	[1820, 1821]	1952	[2684, 1344]	2807	[2012, 705]
243	[457, 458]	1098	[1822, 1823]	1953	[948, 911]	2808	[3301, 2106]
244	[459, 460]	1099	[1567, 1824]	1954	[2399, 1061]	2809	[3216, 3302]
245	[461, 462]	1100	[1825, 1535]	1955	[394, 2275]	2810	[3040, 153]
246	[463, 464]	1101	[1617, 1826]	1956	[930, 2611]	2811	[2875, 2165]
247	[465, 466]	1102	[1827, 1828]	1957	[343, 1381]	2812	[3303, 348]
248	[467, 468]	1103	[1829, 1830]	1958	[319, 1053]	2813	[2359, 2630]
249	[469, 470]	1104	[1831, 1832]	1959	[2490, 2685]	2814	[1257, 95]
250	[12, 183]	1105	[1833, 1834]	1960	[2686, 370]	2815	[2744, 3304]
251	[471, 472]	1106	[1835, 1836]	1961	[1392, 2563]	2816	[2470, 931]
252	[473, 474]	1107	[1837, 1838]	1962	[941, 2553]	2817	[1183, 3305]
253	[475, 476]	1108	[1655, 1839]	1963	[2500, 2400]	2818	[937, 369]
254	[477, 478]	1109	[466, 1840]	1964	[898, 2687]	2819	[1184, 1241]
255	[236, 479]	1110	[1841, 1842]	1965	[2281, 2665]	2820	[2356, 909]
256	[480, 481]	1111	[144, 1843]	1966	[1006, 2688]	2821	[389, 2522]
257	[482, 483]	1112	[230, 1844]	1967	[1093, 1388]	2822	[2345, 1034]
258	[484, 189]	1113	[1469, 1845]	1968	[1188, 2689]	2823	[284, 2785]
259	[485, 486]	1114	[1811, 1846]	1969	[2690, 455]	2824	[2775, 2535]
260	[487, 488]	1115	[1847, 229]	1970	[2355, 1219]	2825	[1416, 978]
261	[489, 490]	1116	[1848, 1849]	1971	[2438, 2325]	2826	[2627, 75]
262	[491, 492]	1117	[1850, 1718]	1972	[2691, 2692]	2827	[277, 1139]
263	[493, 494]	1118	[724, 1851]	1973	[2617, 2616]	2828	[2759, 2604]
264	[495, 496]	1119	[1852, 1853]	1974	[1012, 2693]	2829	[402, 2281]
265	[497, 498]	1120	[1712, 1854]	1975	[2443, 2694]	2830	[1396, 3306]
266	[499, 500]	1121	[1855, 1445]	1976	[2695, 1185]	2831	[2724, 1336]
267	[501, 502]	1122	[1856, 1810]	1977	[2696, 1377]	2832	[292, 1255]
268	[503, 504]	1123	[460, 1759]	1978	[2697, 2698]	2833	[1240, 3307]
269	[505, 506]	1124	[1857, 1858]	1979	[982, 1191]	2834	[2525, 2728]
270	[200, 507]	1125	[1859, 1860]	1980	[376, 1336]	2835	[3308, 1216]
271	[508, 509]	1126	[726, 1861]	1981	[2390, 2545]	2836	[293, 2658]
272	[510, 511]	1127	[1862, 477]	1982	[2318, 2257]	2837	[1016, 2493]
273	[512, 513]	1128	[1863, 1571]	1983	[1267, 2430]	2838	[3309, 2644]
274	[514, 515]	1129	[1864, 1865]	1984	[1225, 1097]	2839	[2649, 2497]
275	[516, 517]	1130	[1866, 1867]	1985	[2699, 2504]	2840	[910, 2579]
276	[518, 519]	1131	[1868, 1833]	1986	[2700, 111]	2841	[3310, 3311]
277	[520, 521]	1132	[577, 1869]	1987	[1245, 84]	2842	[2383, 2379]
278	[522, 233]	1133	[1870, 1871]	1988	[2560, 2701]	2843	[1090, 3312]
279	[523, 524]	1134	[1755, 1872]	1989	[917, 1276]	2844	[3308, 348]
280	[525, 526]	1135	[1873, 1874]	1990	[935, 1039]	2845	[251, 1096]
281	[527, 528]	1136	[1671, 1875]	1991	[1110, 2687]	2846	[16, 2471]
282	[529, 529]	1137	[1876, 176]	1992	[927, 2702]	2847	[2673, 3306]
283	[530, 531]	1138	[1877, 1831]	1993	[2703, 2704]	2848	[848, 398]
284	[532, 533]	1139	[1878, 2]	1994	[869, 2241]	2849	[29, 3313]
285	[534, 535]	1140	[783, 209]	1995	[2705, 2706]	2850	[3314, 3315]

286	[536, 537]	1141	[1645, 1879]	1996	[2707, 2635]	2851	[1299, 2243]
287	[538, 539]	1142	[1880, 508]	1997	[908, 379]	2852	[1239, 2685]
288	[540, 541]	1143	[1881, 1882]	1998	[2708, 2709]	2853	[2458, 1185]
289	[542, 543]	1144	[1883, 1884]	1999	[2450, 881]	2854	[2717, 2650]
290	[544, 545]	1145	[688, 1525]	2000	[75, 18]	2855	[1014, 3316]
291	[140, 546]	1146	[1885, 1886]	2001	[2710, 452]	2856	[2325, 390]
292	[547, 548]	1147	[575, 1887]	2002	[2711, 2712]	2857	[1378, 2679]
293	[549, 550]	1148	[1760, 1888]	2003	[2531, 2385]	2858	[3317, 1176]
294	[551, 552]	1149	[664, 1889]	2004	[2267, 2614]	2859	[453, 2428]
295	[553, 554]	1150	[1890, 1891]	2005	[331, 2311]	2860	[2633, 1101]
296	[555, 556]	1151	[1892, 1893]	2006	[2713, 2331]	2861	[403, 2665]
297	[557, 558]	1152	[1894, 1649]	2007	[1011, 1313]	2862	[2757, 3318]
298	[559, 560]	1153	[1895, 1896]	2008	[957, 2282]	2863	[277, 1131]
299	[561, 562]	1154	[1897, 629]	2009	[2714, 2715]	2864	[2544, 2600]
300	[563, 564]	1155	[1898, 1899]	2010	[1049, 256]	2865	[450, 1316]
301	[565, 566]	1156	[1900, 1766]	2011	[1264, 1244]	2866	[933, 2681]
302	[567, 568]	1157	[1698, 1901]	2012	[964, 2612]	2867	[2783, 3319]
303	[569, 570]	1158	[1902, 1903]	2013	[2654, 410]	2868	[2670, 3320]
304	[571, 572]	1159	[1904, 1905]	2014	[2691, 2402]	2869	[3321, 1138]
305	[543, 573]	1160	[1906, 1907]	2015	[440, 1312]	2870	[362, 2372]
306	[574, 575]	1161	[1908, 1909]	2016	[2716, 440]	2871	[358, 3307]
307	[576, 577]	1162	[496, 1910]	2017	[1124, 338]	2872	[2533, 3322]
308	[578, 579]	1163	[1882, 763]	2018	[426, 1405]	2873	[2442, 1363]
309	[580, 581]	1164	[1911, 1912]	2019	[1238, 2490]	2874	[2615, 3316]
310	[582, 583]	1165	[1913, 1880]	2020	[2717, 966]	2875	[3323, 336]
311	[584, 585]	1166	[1914, 760]	2021	[2352, 95]	2876	[3309, 3324]
312	[586, 587]	1167	[1915, 1825]	2022	[6, 2718]	2877	[3325, 2799]
313	[588, 589]	1168	[1916, 1917]	2023	[1251, 2376]	2878	[2346, 2638]
314	[590, 591]	1169	[1918, 1683]	2024	[2719, 1165]	2879	[2383, 2559]
315	[592, 593]	1170	[1919, 1920]	2025	[1190, 1175]	2880	[2302, 2513]
316	[594, 595]	1171	[1921, 576]	2026	[2720, 2721]	2881	[258, 2602]
317	[596, 597]	1172	[1922, 1923]	2027	[997, 1308]	2882	[313, 3326]
318	[598, 599]	1173	[1924, 1925]	2028	[909, 380]	2883	[1146, 1079]
319	[600, 601]	1174	[1926, 1927]	2029	[2722, 2288]	2884	[2487, 946]
320	[234, 602]	1175	[1928, 1929]	2030	[2723, 2680]	2885	[2485, 3327]
321	[603, 604]	1176	[1930, 1931]	2031	[2724, 2269]	2886	[2550, 3328]
322	[605, 606]	1177	[1932, 1933]	2032	[2725, 2640]	2887	[1351, 422]
323	[607, 54]	1178	[804, 1934]	2033	[2361, 2726]	2888	[274, 73]
324	[608, 609]	1179	[1935, 1527]	2034	[2270, 2727]	2889	[311, 2567]
325	[498, 610]	1180	[1936, 1937]	2035	[2478, 2728]	2890	[445, 364]
326	[611, 612]	1181	[1938, 1939]	2036	[1348, 417]	2891	[1241, 948]
327	[613, 217]	1182	[1940, 1741]	2037	[2729, 2694]	2892	[3329, 1164]
328	[614, 615]	1183	[126, 1941]	2038	[2730, 2731]	2893	[1368, 1159]
329	[616, 617]	1184	[1942, 1943]	2039	[2549, 1206]	2894	[2643, 3324]

330	[618, 619]	1185	[1480, 1944]	2040	[2732, 333]	2895	[2549, 1256]
331	[620, 621]	1186	[1945, 1946]	2041	[1400, 2707]	2896	[2388, 2769]
332	[622, 623]	1187	[1947, 1948]	2042	[2513, 386]	2897	[2623, 2797]
333	[624, 625]	1188	[1949, 1950]	2043	[2475, 916]	2898	[1330, 3330]
334	[626, 627]	1189	[1951, 1582]	2044	[2647, 2733]	2899	[1039, 853]
335	[628, 608]	1190	[1952, 1953]	2045	[2734, 1378]	2900	[2503, 3331]
336	[629, 630]	1191	[1473, 600]	2046	[2554, 1208]	2901	[2352, 1258]
337	[631, 632]	1192	[1954, 580]	2047	[2735, 940]	2902	[1343, 1281]
338	[633, 634]	1193	[155, 8]	2048	[2542, 396]	2903	[3332, 259]
339	[635, 636]	1194	[1955, 1956]	2049	[2736, 1120]	2904	[3333, 3334]
340	[637, 638]	1195	[1957, 1622]	2050	[2737, 2738]	2905	[1111, 1318]
341	[639, 640]	1196	[468, 1958]	2051	[969, 2739]	2906	[357, 1035]
342	[641, 642]	1197	[1959, 1960]	2052	[305, 1245]	2907	[863, 1266]
343	[643, 644]	1198	[1551, 1961]	2053	[2479, 2740]	2908	[2703, 920]
344	[645, 646]	1199	[1962, 827]	2054	[1226, 1098]	2909	[943, 2456]
345	[647, 648]	1200	[1887, 1761]	2055	[1166, 1142]	2910	[3335, 360]
346	[649, 650]	1201	[1749, 1963]	2056	[385, 2536]	2911	[401, 1274]
347	[651, 652]	1202	[1964, 1965]	2057	[2741, 1353]	2912	[2572, 1166]
348	[653, 654]	1203	[1966, 1967]	2058	[303, 2576]	2913	[72, 275]
349	[655, 656]	1204	[1690, 1499]	2059	[354, 2742]	2914	[2447, 1172]
350	[657, 658]	1205	[1968, 1969]	2060	[1394, 348]	2915	[2339, 1285]
351	[659, 660]	1206	[1619, 1970]	2061	[1020, 2491]	2916	[120, 255]
352	[661, 662]	1207	[1621, 1971]	2062	[1176, 433]	2917	[2659, 2731]
353	[663, 664]	1208	[1972, 1491]	2063	[2743, 351]	2918	[289, 1058]
354	[665, 666]	1209	[1973, 1852]	2064	[297, 381]	2919	[69, 3336]
355	[47, 667]	1210	[1974, 1975]	2065	[2744, 2588]	2920	[2547, 327]
356	[668, 669]	1211	[1946, 1976]	2066	[2514, 2745]	2921	[347, 2573]
357	[670, 671]	1212	[1977, 1978]	2067	[106, 425]	2922	[882, 1106]
358	[672, 673]	1213	[1979, 1980]	2068	[2746, 1354]	2923	[1223, 2777]
359	[674, 675]	1214	[1981, 1982]	2069	[2533, 2626]	2924	[254, 3328]
360	[676, 677]	1215	[1983, 1668]	2070	[2353, 1244]	2925	[264, 1117]
361	[678, 679]	1216	[1984, 1451]	2071	[2453, 2636]	2926	[2414, 3337]
362	[680, 681]	1217	[1985, 1986]	2072	[1008, 2747]	2927	[272, 3338]
363	[682, 527]	1218	[801, 1987]	2073	[2722, 2655]	2928	[2401, 2692]
364	[683, 684]	1219	[1988, 1989]	2074	[877, 2529]	2929	[434, 2264]
365	[685, 686]	1220	[1648, 1618]	2075	[952, 324]	2930	[1077, 1323]
366	[687, 688]	1221	[1990, 1991]	2076	[66, 1141]	2931	[2496, 3339]
367	[689, 690]	1222	[1992, 1993]	2077	[423, 2608]	2932	[2292, 3340]
368	[691, 692]	1223	[1994, 1995]	2078	[1048, 2748]	2933	[2456, 1228]
369	[693, 694]	1224	[1991, 1996]	2079	[2749, 1390]	2934	[2461, 2370]
370	[57, 695]	1225	[1925, 1890]	2080	[1147, 2727]	2935	[352, 2292]
371	[696, 697]	1226	[1997, 1998]	2081	[2750, 85]	2936	[849, 2514]
372	[698, 699]	1227	[1437, 1577]	2082	[960, 2751]	2937	[2734, 1205]
373	[556, 700]	1228	[1999, 2000]	2083	[2388, 1081]	2938	[1175, 2240]

374	[701, 702]	1229	[1803, 712]	2084	[2365, 248]	2939	[246, 1359]
375	[703, 704]	1230	[2001, 2002]	2085	[944, 2457]	2940	[1190, 2239]
376	[705, 32]	1231	[2003, 2004]	2086	[2686, 891]	2941	[3341, 926]
377	[706, 707]	1232	[2005, 2006]	2087	[2752, 2648]	2942	[2327, 2550]
378	[708, 709]	1233	[2007, 2008]	2088	[1322, 27]	2943	[2794, 2630]
379	[710, 711]	1234	[2009, 2010]	2089	[305, 83]	2944	[2746, 2416]
380	[712, 713]	1235	[2011, 2012]	2090	[2753, 2754]	2945	[1118, 1300]
381	[714, 205]	1236	[2013, 2014]	2091	[2555, 2755]	2946	[428, 2571]
382	[558, 715]	1237	[1510, 2015]	2092	[2336, 2499]	2947	[875, 2640]
383	[716, 717]	1238	[2016, 2017]	2093	[2756, 980]	2948	[2616, 1341]
384	[718, 512]	1239	[2018, 2019]	2094	[306, 1060]	2949	[262, 1402]
385	[719, 720]	1240	[1688, 2020]	2095	[857, 2620]	2950	[452, 416]
386	[721, 722]	1241	[2021, 2022]	2096	[2757, 2758]	2951	[1129, 2434]
387	[723, 724]	1242	[2023, 1552]	2097	[409, 2674]	2952	[859, 1118]
388	[725, 726]	1243	[1509, 2024]	2098	[2759, 2760]	2953	[2400, 1369]
389	[727, 728]	1244	[2025, 135]	2099	[2249, 2761]	2954	[2418, 1234]
390	[545, 729]	1245	[2026, 703]	2100	[2762, 1189]	2955	[2256, 896]
391	[730, 731]	1246	[573, 2027]	2101	[2763, 895]	2956	[1234, 3304]
392	[732, 733]	1247	[1821, 2028]	2102	[1132, 2629]	2957	[367, 1145]
393	[734, 735]	1248	[1758, 2029]	2103	[1412, 1155]	2958	[2526, 1337]
394	[736, 737]	1249	[1452, 2030]	2104	[2450, 1313]	2959	[279, 3312]
395	[738, 739]	1250	[2031, 1449]	2105	[2741, 2341]	2960	[2562, 1393]
396	[740, 741]	1251	[2032, 2033]	2106	[891, 371]	2961	[2476, 929]
397	[742, 743]	1252	[2034, 2035]	2107	[265, 1031]	2962	[2276, 2807]
398	[744, 745]	1253	[2036, 1762]	2108	[2490, 2460]	2963	[349, 1319]
399	[746, 747]	1254	[2037, 2038]	2109	[2764, 1352]	2964	[3342, 3320]
400	[748, 749]	1255	[1963, 2039]	2110	[2765, 2766]	2965	[3343, 2409]
401	[750, 751]	1256	[650, 738]	2111	[2528, 878]	2966	[324, 1291]
402	[752, 753]	1257	[2040, 2041]	2112	[956, 1070]	2967	[3344, 3345]
403	[754, 480]	1258	[1939, 1974]	2113	[101, 2542]	2968	[2636, 1279]
404	[755, 756]	1259	[1702, 2042]	2114	[949, 1324]	2969	[1350, 2453]
405	[757, 489]	1260	[700, 2043]	2115	[2767, 113]	2970	[2673, 2250]
406	[758, 759]	1261	[528, 2044]	2116	[1280, 2768]	2971	[1345, 2581]
407	[760, 761]	1262	[2045, 1570]	2117	[926, 2769]	2972	[2793, 2397]
408	[202, 762]	1263	[2046, 2047]	2118	[2263, 435]	2973	[1052, 320]
409	[763, 764]	1264	[2048, 714]	2119	[2770, 2771]	2974	[295, 2446]
410	[765, 191]	1265	[1872, 2049]	2120	[2772, 2287]	2975	[346, 3319]
411	[766, 767]	1266	[2050, 2051]	2121	[2362, 2773]	2976	[2792, 1212]
412	[768, 769]	1267	[157, 2052]	2122	[87, 1391]	2977	[3319, 959]
413	[770, 771]	1268	[2053, 2054]	2123	[1165, 994]	2978	[2414, 334]
414	[554, 772]	1269	[652, 2055]	2124	[2730, 2660]	2979	[2416, 2363]
415	[773, 774]	1270	[831, 2056]	2125	[2774, 1094]	2980	[2803, 2558]
416	[775, 776]	1271	[2057, 151]	2126	[2489, 1239]	2981	[291, 1254]
417	[671, 777]	1272	[2058, 2021]	2127	[2775, 2776]	2982	[2419, 2465]

418	[778, 779]	1273	[2059, 2060]	2128	[2349, 2777]	2983	[2795, 2651]
419	[780, 781]	1274	[2061, 2062]	2129	[1063, 1251]	2984	[3346, 2747]
420	[782, 783]	1275	[2063, 1642]	2130	[2556, 2297]	2985	[2764, 2741]
421	[784, 785]	1276	[1826, 1964]	2131	[1072, 2295]	2986	[2307, 2572]
422	[786, 611]	1277	[1433, 2064]	2132	[978, 1017]	2987	[2608, 330]
423	[787, 618]	1278	[1731, 1739]	2133	[2778, 93]	2988	[2593, 1129]
424	[788, 789]	1279	[182, 2065]	2134	[2455, 2779]	2989	[2392, 3347]
425	[790, 791]	1280	[2066, 2067]	2135	[2780, 2503]	2990	[309, 342]
426	[792, 793]	1281	[1641, 2068]	2136	[2511, 338]	2991	[103, 1280]
427	[794, 795]	1282	[2047, 2069]	2137	[2676, 2248]	2992	[1060, 2471]
428	[796, 797]	1283	[2070, 1949]	2138	[1326, 2380]	2993	[3329, 2259]
429	[798, 799]	1284	[1840, 2071]	2139	[1180, 1179]	2994	[3348, 2688]
430	[800, 801]	1285	[2072, 2073]	2140	[2781, 2782]	2995	[1317, 1112]
431	[802, 13]	1286	[2074, 2023]	2141	[2783, 347]	2996	[893, 1375]
432	[803, 804]	1287	[2075, 2076]	2142	[2565, 2448]	2997	[1299, 431]
433	[805, 806]	1288	[2077, 2078]	2143	[2254, 77]	2998	[3349, 2699]
434	[807, 808]	1289	[2079, 2080]	2144	[983, 1192]	2999	[1331, 2739]
435	[509, 809]	1290	[2081, 2082]	2145	[117, 365]	3000	[2566, 87]
436	[810, 811]	1291	[1788, 2083]	2146	[2736, 428]	3001	[3319, 2573]
437	[812, 813]	1292	[610, 1502]	2147	[2784, 2621]	3002	[879, 2344]
438	[814, 815]	1293	[634, 2084]	2148	[871, 2568]	3003	[3350, 1356]
439	[816, 465]	1294	[833, 1647]	2149	[2495, 2785]	3004	[1123, 2511]
440	[817, 818]	1295	[2085, 2086]	2150	[2413, 333]	3005	[1413, 1156]
441	[819, 820]	1296	[2087, 1447]	2151	[2395, 2508]	3006	[862, 947]
442	[821, 590]	1297	[2002, 178]	2152	[77, 2744]	3007	[1367, 904]
443	[822, 823]	1298	[2088, 802]	2153	[995, 1107]	3008	[3351, 925]
444	[824, 825]	1299	[2089, 2090]	2154	[1059, 1245]	3009	[1056, 957]
445	[826, 685]	1300	[2091, 2092]	2155	[2478, 2786]	3010	[2406, 2655]
446	[827, 828]	1301	[2093, 2094]	2156	[1193, 310]	3011	[2518, 116]
447	[566, 829]	1302	[2095, 1726]	2157	[939, 2787]	3012	[1372, 2755]
448	[830, 831]	1303	[2096, 1863]	2158	[985, 111]	3013	[2690, 1208]
449	[832, 833]	1304	[2097, 2098]	2159	[2788, 2789]	3014	[3352, 2678]
450	[834, 835]	1305	[2099, 544]	2160	[2336, 361]	3015	[2796, 2254]
451	[836, 837]	1306	[1980, 596]	2161	[1204, 1378]	3016	[1363, 1233]
452	[838, 839]	1307	[2090, 1711]	2162	[2683, 1078]	3017	[1256, 394]
453	[840, 672]	1308	[1657, 1936]	2163	[367, 2683]	3018	[876, 1267]
454	[841, 842]	1309	[2100, 2101]	2164	[2790, 2791]	3019	[3353, 3354]
455	[843, 844]	1310	[1948, 2102]	2165	[2624, 352]	3020	[2400, 1062]
456	[845, 846]	1311	[163, 1894]	2166	[901, 2738]	3021	[115, 2519]
457	[847, 848]	1312	[2103, 2104]	2167	[2792, 336]	3022	[2441, 2700]
458	[849, 850]	1313	[519, 1774]	2168	[2793, 98]	3023	[1155, 2268]
459	[851, 852]	1314	[1886, 1841]	2169	[2651, 2622]	3024	[3317, 432]
460	[853, 303]	1315	[208, 2105]	2170	[2408, 308]	3025	[3352, 3355]
461	[854, 120]	1316	[2106, 2107]	2171	[2794, 998]	3026	[1065, 2591]

462	[855, 419]	1317	[2108, 2109]	2172	[2445, 296]	3027	[2640, 1267]
463	[447, 856]	1318	[2044, 2110]	2173	[2795, 2286]	3028	[1076, 1322]
464	[857, 858]	1319	[654, 551]	2174	[1387, 1311]	3029	[301, 446]
465	[859, 860]	1320	[2111, 2112]	2175	[2381, 1083]	3030	[20, 1348]
466	[861, 862]	1321	[2113, 2114]	2176	[2756, 974]	3031	[3356, 3327]
467	[863, 864]	1322	[2115, 56]	2177	[2651, 2389]	3032	[1370, 941]
468	[865, 866]	1323	[2116, 2117]	2178	[2661, 1191]	3033	[304, 3357]
469	[867, 868]	1324	[2118, 2119]	2179	[2310, 332]	3034	[328, 2702]
470	[869, 856]	1325	[2120, 2121]	2180	[2494, 284]	3035	[2754, 1069]
471	[411, 112]	1326	[132, 2122]	2181	[1210, 2266]	3036	[2601, 403]
472	[24, 870]	1327	[619, 2123]	2182	[2752, 2733]	3037	[368, 938]
473	[871, 872]	1328	[2124, 2125]	2183	[2796, 76]	3038	[2608, 2610]
474	[873, 874]	1329	[2126, 2127]	2184	[1131, 1042]	3039	[1202, 2502]
475	[875, 876]	1330	[2128, 2129]	2185	[1410, 1358]	3040	[63, 2559]
476	[877, 878]	1331	[1536, 2130]	2186	[414, 2412]	3041	[1344, 1046]
477	[879, 880]	1332	[1553, 2131]	2187	[1327, 2797]	3042	[2331, 2809]
478	[881, 882]	1333	[2132, 2133]	2188	[2655, 1022]	3043	[2672, 1396]
479	[326, 883]	1334	[2134, 1748]	2189	[1212, 337]	3044	[2781, 2510]
480	[884, 885]	1335	[2135, 2136]	2190	[2798, 1122]	3045	[2582, 1351]
481	[886, 887]	1336	[1814, 166]	2191	[1357, 1411]	3046	[328, 928]
482	[342, 888]	1337	[2137, 1892]	2192	[2374, 2799]	3047	[975, 2506]
483	[350, 889]	1338	[1592, 2138]	2193	[375, 2724]	3048	[390, 887]
484	[890, 891]	1339	[2139, 2140]	2194	[2527, 2520]	3049	[1103, 2247]
485	[892, 893]	1340	[2141, 2142]	2195	[1260, 1115]	3050	[257, 384]
486	[894, 378]	1341	[2143, 2144]	2196	[2774, 1388]	3051	[2713, 961]
487	[895, 896]	1342	[2145, 1898]	2197	[2800, 2801]	3052	[1339, 2806]
488	[897, 898]	1343	[196, 1947]	2198	[452, 1348]	3053	[1232, 1364]
489	[899, 900]	1344	[2146, 2147]	2199	[386, 2802]	3054	[2317, 1129]
490	[901, 902]	1345	[1588, 2148]	2200	[2762, 2689]	3055	[2364, 247]
491	[903, 904]	1346	[2149, 2150]	2201	[893, 871]	3056	[1395, 2673]
492	[282, 905]	1347	[2151, 659]	2202	[2803, 2804]	3057	[2509, 2782]
493	[906, 907]	1348	[39, 2152]	2203	[2805, 972]	3058	[2765, 439]
494	[908, 909]	1349	[839, 1750]	2204	[379, 933]	3059	[3323, 1212]
495	[910, 911]	1350	[2153, 786]	2205	[1265, 864]	3060	[3358, 1155]
496	[912, 329]	1351	[2154, 124]	2206	[984, 2700]	3061	[2603, 2760]
497	[913, 886]	1352	[2155, 2156]	2207	[2492, 2806]	3062	[3359, 1019]
498	[914, 413]	1353	[2157, 1508]	2208	[1236, 2807]	3063	[3360, 2438]
499	[915, 335]	1354	[2158, 2115]	2209	[2320, 2527]	3064	[1310, 2314]
500	[916, 122]	1355	[2159, 2160]	2210	[1278, 1291]	3065	[2265, 1211]
501	[917, 918]	1356	[2161, 1752]	2211	[2700, 411]	3066	[2301, 2530]
502	[919, 920]	1357	[2162, 821]	2212	[2379, 2560]	3067	[2511, 2653]
503	[921, 922]	1358	[2163, 2164]	2213	[1101, 917]	3068	[3314, 2706]
504	[381, 325]	1359	[1828, 1857]	2214	[2625, 2292]	3069	[3361, 3318]
505	[923, 924]	1360	[2165, 172]	2215	[2808, 1223]	3070	[2433, 2669]

506	[925, 926]	1361	[2140, 2166]	2216	[2710, 20]	3071	[2505, 957]
507	[927, 928]	1362	[795, 2167]	2217	[2551, 2789]	3072	[1137, 1087]
508	[339, 929]	1363	[2168, 2046]	2218	[961, 2809]	3073	[3362, 1058]
509	[930, 931]	1364	[2169, 2170]	2219	[1402, 2354]	3074	[333, 3337]
510	[280, 932]	1365	[2171, 2099]	2220	[1184, 947]	3075	[92, 2383]
511	[933, 934]	1366	[2172, 2173]	2221	[2586, 2284]	3076	[1054, 2646]
512	[935, 936]	1367	[2174, 1904]	2222	[2810, 984]	3077	[2716, 1311]
513	[937, 938]	1368	[2175, 2045]	2223	[1124, 2653]	3078	[2298, 2483]
514	[939, 940]	1369	[2176, 2177]	2224	[292, 2811]	3079	[3363, 1137]
515	[941, 942]	1370	[2178, 1575]	2225	[1023, 269]	3080	[2696, 2585]
516	[943, 944]	1371	[2179, 2180]	2226	[2754, 907]	3081	[3364, 1401]
517	[945, 946]	1372	[2181, 2182]	2227	[2520, 2373]	3082	[1308, 3313]
518	[947, 948]	1373	[2183, 2174]	2228	[2771, 2305]	3083	[1408, 2291]
519	[949, 950]	1374	[1971, 1808]	2229	[2810, 2441]	3084	[1049, 849]
520	[951, 952]	1375	[1467, 2184]	2230	[2329, 1383]	3085	[3365, 925]
521	[953, 954]	1376	[1669, 2185]	2231	[2771, 1288]	3086	[964, 3330]
522	[955, 956]	1377	[686, 2186]	2232	[2421, 2548]	3087	[1263, 428]
523	[957, 958]	1378	[2187, 1607]	2233	[2449, 1011]	3088	[986, 2405]
524	[959, 960]	1379	[2188, 2189]	2234	[1002, 2301]	3089	[2301, 3366]
525	[961, 962]	1380	[2006, 2157]	2235	[2438, 913]	3090	[2625, 25]
526	[963, 964]	1381	[642, 1782]	2236	[2812, 2002]	3091	[106, 1109]
527	[965, 966]	1382	[2190, 2191]	2237	[2101, 1797]	3092	[3353, 1415]
528	[967, 968]	1383	[2054, 2192]	2238	[2813, 1457]	3093	[3367, 862]
529	[969, 970]	1384	[1475, 2193]	2239	[1816, 649]	3094	[435, 2682]
530	[971, 972]	1385	[2194, 2195]	2240	[1927, 2814]	3095	[398, 2543]
531	[973, 974]	1386	[1813, 755]	2241	[828, 1434]	3096	[1414, 3354]
532	[975, 976]	1387	[2196, 819]	2242	[2815, 2816]	3097	[979, 2625]
533	[977, 978]	1388	[1889, 2197]	2243	[1565, 2817]	3098	[1229, 445]
534	[979, 352]	1389	[2198, 788]	2244	[2112, 616]	3099	[3368, 2575]
535	[980, 981]	1390	[2199, 2200]	2245	[2065, 1609]	3100	[2471, 2578]
536	[982, 983]	1391	[486, 2201]	2246	[2133, 1792]	3101	[1041, 2393]
537	[984, 985]	1392	[2202, 2203]	2247	[2818, 2819]	3102	[364, 118]
538	[986, 987]	1393	[2204, 2205]	2248	[2820, 1563]	3103	[2628, 1133]
539	[988, 989]	1394	[2206, 1985]	2249	[2821, 2822]	3104	[1208, 1237]
540	[990, 991]	1395	[2180, 2207]	2250	[2207, 2823]	3105	[2705, 3315]
541	[992, 993]	1396	[2208, 2209]	2251	[2824, 1817]	3106	[2737, 902]
542	[994, 995]	1397	[2210, 1717]	2252	[2825, 1677]	3107	[2805, 2549]
543	[996, 997]	1398	[2211, 1654]	2253	[2055, 1637]	3108	[2780, 2699]
544	[998, 999]	1399	[1722, 2194]	2254	[667, 503]	3109	[3356, 2486]
545	[1000, 1001]	1400	[2212, 2213]	2255	[2826, 2827]	3110	[1397, 367]
546	[1002, 1003]	1401	[2214, 2215]	2256	[2828, 1973]	3111	[102, 2467]
547	[1004, 1005]	1402	[1455, 2216]	2257	[1482, 651]	3112	[1185, 2761]
548	[1006, 1007]	1403	[2217, 2218]	2258	[2177, 1822]	3113	[936, 853]
549	[1008, 1009]	1404	[2219, 2220]	2259	[1960, 765]	3114	[2290, 1409]

550	[1010, 1011]	1405	[2221, 2222]	2260	[2164, 2162]	3115	[1089, 279]
551	[4, 1012]	1406	[1608, 1959]	2261	[2829, 2830]	3116	[2342, 303]
552	[1013, 405]	1407	[2223, 2224]	2262	[2831, 2832]	3117	[2662, 2352]
553	[1014, 1015]	1408	[2225, 2226]	2263	[677, 2833]	3118	[3369, 3370]
554	[1016, 1017]	1409	[2227, 1599]	2264	[2834, 2835]	3119	[2243, 1307]
555	[1018, 1019]	1410	[2010, 1528]	2265	[617, 2836]	3120	[2259, 2654]
556	[1020, 1021]	1411	[2228, 635]	2266	[2837, 2040]	3121	[1104, 1043]
557	[1022, 1023]	1412	[2229, 1632]	2267	[2148, 2838]	3122	[1222, 1294]
558	[1024, 1025]	1413	[2230, 549]	2268	[2839, 1918]	3123	[2272, 1012]
559	[848, 1026]	1414	[1742, 2231]	2269	[704, 2840]	3124	[903, 1368]
560	[1027, 1028]	1415	[2232, 2233]	2270	[2841, 2842]	3125	[2653, 2476]
561	[1029, 444]	1416	[2234, 2235]	2271	[2843, 1650]	3126	[438, 2766]
562	[876, 1030]	1417	[2236, 1090]	2272	[2844, 2845]	3127	[1172, 2599]
563	[1031, 1032]	1418	[2237, 1273]	2273	[8, 2846]	3128	[2422, 2497]
564	[1033, 950]	1419	[915, 951]	2274	[568, 2847]	3129	[2396, 991]
565	[1034, 1035]	1420	[2238, 930]	2275	[458, 2848]	3130	[1368, 2432]
566	[1013, 1036]	1421	[2239, 2240]	2276	[2849, 2850]	3131	[3335, 2336]
567	[1037, 916]	1422	[447, 2241]	2277	[500, 2851]	3132	[2602, 3338]
568	[1038, 1039]	1423	[2242, 1171]	2278	[2852, 2853]	3133	[1230, 117]
569	[1040, 1041]	1424	[1216, 349]	2279	[2854, 2151]	3134	[3325, 2375]
570	[1042, 1043]	1425	[2243, 5]	2280	[2855, 1935]	3135	[2677, 3355]
571	[1044, 1045]	1426	[2244, 912]	2281	[2856, 201]	3136	[1360, 2327]
572	[1046, 1047]	1427	[327, 927]	2282	[1756, 1862]	3137	[1012, 2668]
573	[995, 1048]	1428	[1323, 2245]	2283	[1874, 2857]	3138	[310, 888]
574	[120, 1049]	1429	[1142, 1048]	2284	[2858, 2859]	3139	[2711, 2709]
575	[1050, 1051]	1430	[2246, 1275]	2285	[1704, 2860]	3140	[2305, 1289]
576	[1052, 1053]	1431	[246, 2247]	2286	[2861, 766]	3141	[2351, 1257]
577	[1054, 1055]	1432	[955, 2248]	2287	[1448, 2862]	3142	[2788, 2552]
578	[1056, 1057]	1433	[2249, 1186]	2288	[1996, 2009]	3143	[1019, 3322]
579	[1058, 1059]	1434	[1396, 2250]	2289	[2863, 643]	3144	[959, 1269]
580	[991, 1060]	1435	[1244, 298]	2290	[2864, 2865]	3145	[3365, 3341]
581	[1061, 1062]	1436	[2251, 2252]	2291	[2866, 2134]	3146	[1218, 270]
582	[1063, 1064]	1437	[2253, 2254]	2292	[2197, 1646]	3147	[1030, 1268]
583	[1065, 1066]	1438	[2255, 2256]	2293	[1998, 2204]	3148	[2536, 2802]
584	[1067, 1068]	1439	[885, 2257]	2294	[1801, 2867]	3149	[67, 1326]
585	[906, 1069]	1440	[2258, 1097]	2295	[1845, 2868]	3150	[95, 1283]
586	[1070, 1071]	1441	[1279, 104]	2296	[1631, 2869]	3151	[325, 1044]
587	[1072, 1073]	1442	[2259, 409]	2297	[1462, 2870]	3152	[1346, 2279]
588	[1074, 1075]	1443	[442, 2260]	2298	[2871, 2872]	3153	[2335, 360]
589	[1076, 1077]	1444	[2261, 1125]	2299	[2873, 2874]	3154	[2534, 2776]
590	[1078, 1079]	1445	[2256, 2262]	2300	[1781, 2875]	3155	[1101, 1275]
591	[1080, 424]	1446	[2263, 2264]	2301	[2876, 2190]	3156	[860, 1119]
592	[926, 1081]	1447	[2265, 2266]	2302	[1663, 2877]	3157	[25, 3340]
593	[1082, 1083]	1448	[2267, 1197]	2303	[2878, 131]	3158	[413, 451]

594	[401, 1084]	1449	[1413, 2268]	2304	[2879, 2880]	3159	[2376, 866]
595	[1085, 255]	1450	[2269, 2270]	2305	[2881, 1837]	3160	[347, 959]
596	[1086, 1087]	1451	[377, 2271]	2306	[1943, 2882]	3161	[2448, 1173]
597	[913, 390]	1452	[2272, 2273]	2307	[2883, 1914]	3162	[3368, 1253]
598	[1088, 252]	1453	[386, 2274]	2308	[2884, 1616]	3163	[2527, 1150]
599	[1089, 1090]	1454	[244, 2275]	2309	[2885, 2886]	3164	[2665, 102]
600	[1091, 1092]	1455	[2276, 2277]	2310	[791, 2887]	3165	[1242, 327]
601	[1093, 1094]	1456	[2278, 2279]	2311	[2888, 1908]	3166	[268, 1259]
602	[1095, 415]	1457	[2264, 2280]	2312	[2889, 2890]	3167	[2349, 1224]
603	[1088, 1096]	1458	[2281, 101]	2313	[2891, 2892]	3168	[416, 1349]
604	[1097, 1098]	1459	[1057, 2282]	2314	[2893, 484]	3169	[3363, 1086]
605	[853, 1099]	1460	[1059, 83]	2315	[2121, 2894]	3170	[2409, 1026]
606	[1100, 1101]	1461	[2242, 1342]	2316	[2092, 719]	3171	[1099, 304]
607	[302, 869]	1462	[80, 1375]	2317	[1514, 2895]	3172	[1243, 328]
608	[1102, 1103]	1463	[2283, 2284]	2318	[2896, 2897]	3173	[998, 2607]
609	[1104, 1105]	1464	[2285, 2286]	2319	[2898, 2899]	3174	[2564, 345]
610	[1067, 1106]	1465	[260, 2287]	2320	[2136, 2900]	3175	[3321, 277]
611	[1107, 1108]	1466	[2288, 1022]	2321	[1953, 2901]	3176	[340, 2726]
612	[424, 1109]	1467	[974, 981]	2322	[1531, 2163]	3177	[2635, 2355]
613	[897, 1110]	1468	[2289, 2272]	2323	[2167, 805]	3178	[2512, 385]
614	[1111, 1112]	1469	[2290, 2291]	2324	[1777, 2026]	3179	[2723, 2642]
615	[254, 1113]	1470	[2292, 26]	2325	[2902, 730]	3180	[1098, 2656]
616	[1114, 1115]	1471	[113, 1271]	2326	[1967, 2093]	3181	[919, 2704]
617	[1070, 318]	1472	[1098, 2293]	2327	[2903, 2904]	3182	[3333, 1195]
618	[1116, 1117]	1473	[2294, 2295]	2328	[2201, 2905]	3183	[63, 2379]
619	[1118, 1119]	1474	[2296, 2297]	2329	[36, 2229]	3184	[2594, 1080]
620	[1120, 429]	1475	[2298, 2299]	2330	[2906, 2907]	3185	[1091, 2698]
621	[1085, 1049]	1476	[2300, 2301]	2331	[2908, 2909]	3186	[2269, 1147]
622	[1121, 1122]	1477	[2302, 385]	2332	[2910, 185]	3187	[1039, 2342]
623	[1123, 1124]	1478	[2303, 2304]	2333	[2911, 2912]	3188	[1289, 2410]
624	[1125, 1126]	1479	[2305, 2306]	2334	[2913, 2141]	3189	[1003, 3366]
625	[1127, 259]	1480	[1025, 316]	2335	[2914, 534]	3190	[1230, 364]
626	[1128, 288]	1481	[2307, 1165]	2336	[2915, 2910]	3191	[2743, 889]
627	[1129, 1130]	1482	[121, 2308]	2337	[601, 1954]	3192	[2573, 960]
628	[1131, 1104]	1483	[2309, 1315]	2338	[1912, 792]	3193	[1116, 265]
629	[1132, 1133]	1484	[2310, 2311]	2339	[61, 2916]	3194	[2784, 2771]
630	[1134, 1135]	1485	[2312, 2313]	2340	[2917, 2918]	3195	[1080, 106]
631	[1136, 1137]	1486	[2306, 407]	2341	[492, 2132]	3196	[1042, 1105]
632	[1138, 1139]	1487	[1141, 109]	2342	[1729, 2919]	3197	[885, 2319]
633	[1140, 1141]	1488	[1060, 1220]	2343	[2920, 52]	3198	[1035, 2773]
634	[1142, 1107]	1489	[1198, 2314]	2344	[1634, 2921]	3199	[2255, 895]
635	[1143, 1144]	1490	[2315, 2316]	2345	[1765, 655]	3200	[1361, 3339]
636	[1145, 1146]	1491	[2317, 1309]	2346	[2922, 2923]	3201	[2258, 1226]
637	[1147, 1148]	1492	[2318, 2319]	2347	[2924, 1922]	3202	[2732, 2414]

638	[1025, 1149]	1493	[1250, 1064]	2348	[2925, 2926]	3203	[1295, 2474]
639	[1150, 1151]	1494	[2320, 1337]	2349	[2927, 2928]	3204	[3359, 2533]
640	[1152, 1153]	1495	[339, 2321]	2350	[1987, 750]	3205	[2729, 2444]
641	[356, 1034]	1496	[393, 2322]	2351	[128, 58]	3206	[2440, 984]
642	[1029, 1154]	1497	[1404, 427]	2352	[2929, 2070]	3207	[1200, 2624]
643	[1155, 1156]	1498	[2323, 944]	2353	[2930, 1652]	3208	[2772, 261]
644	[1022, 268]	1499	[2324, 2325]	2354	[2931, 2837]	3209	[1301, 2616]
645	[1157, 1158]	1500	[336, 1213]	2355	[2215, 2932]	3210	[2597, 1215]
646	[904, 1159]	1501	[287, 2326]	2356	[820, 231]	3211	[2607, 923]
647	[977, 1016]	1502	[315, 1149]	2357	[2933, 2934]	3212	[3343, 848]
648	[1160, 1161]	1503	[1407, 2327]	2358	[2900, 2935]	3213	[2798, 2639]
649	[1162, 1032]	1504	[1004, 2328]	2359	[2936, 1744]	3214	[2574, 2724]
650	[1163, 1164]	1505	[1371, 942]	2360	[2937, 2824]	3215	[3349, 2503]
651	[1165, 1166]	1506	[1329, 964]	2361	[2938, 2939]	3216	[1094, 1174]
652	[1167, 1168]	1507	[2329, 2330]	2362	[669, 2940]	3217	[404, 1036]
653	[1169, 4]	1508	[2331, 962]	2363	[2941, 2116]	3218	[2778, 855]
654	[1170, 1171]	1509	[2332, 855]	2364	[2942, 2885]	3219	[3361, 2758]
655	[1172, 1173]	1510	[290, 1059]	2365	[1506, 2943]	3220	[2725, 876]
656	[1174, 1175]	1511	[2333, 2334]	2366	[2944, 2945]	3221	[1038, 936]
657	[1176, 1177]	1512	[2335, 2336]	2367	[2082, 239]	3222	[1010, 2450]
658	[1178, 1110]	1513	[276, 1138]	2368	[2147, 2946]	3223	[1254, 2811]
659	[988, 1179]	1514	[2337, 879]	2369	[1512, 2061]	3224	[1251, 865]
660	[1180, 989]	1515	[1325, 2338]	2370	[743, 2947]	3225	[2497, 1335]
661	[1181, 1182]	1516	[2339, 2340]	2371	[2948, 2949]	3226	[2426, 2331]
662	[1032, 1183]	1517	[1352, 2341]	2372	[490, 757]	3227	[3348, 1007]
663	[861, 1184]	1518	[936, 2342]	2373	[2845, 2950]	3228	[3362, 290]
664	[1185, 1186]	1519	[1358, 2343]	2374	[2951, 2952]	3229	[862, 1241]
665	[1187, 1047]	1520	[993, 2344]	2375	[774, 682]	3230	[2452, 1135]
666	[1188, 1189]	1521	[2345, 357]	2376	[2953, 2954]	3231	[2371, 363]
667	[92, 63]	1522	[2346, 2347]	2377	[2033, 1895]	3232	[1157, 3371]
668	[1094, 1190]	1523	[2348, 2349]	2378	[749, 2955]	3233	[2735, 2787]
669	[1191, 1192]	1524	[2270, 1148]	2379	[699, 2956]	3234	[2667, 1232]
670	[1193, 342]	1525	[1219, 2350]	2380	[1879, 1794]	3235	[1303, 3371]
671	[1194, 1195]	1526	[1345, 2338]	2381	[190, 2957]	3236	[435, 2280]
672	[1196, 1197]	1527	[963, 1330]	2382	[214, 2958]	3237	[2707, 2435]
673	[1198, 1199]	1528	[2351, 2352]	2383	[1442, 211]	3238	[2557, 2804]
674	[1200, 979]	1529	[1146, 1027]	2384	[2959, 2960]	3239	[265, 1162]
675	[1201, 292]	1530	[2353, 297]	2385	[1853, 2146]	3240	[3350, 2466]
676	[1202, 1203]	1531	[263, 2354]	2386	[2961, 2962]	3241	[2418, 2744]
677	[1204, 1205]	1532	[2355, 270]	2387	[2963, 2230]	3242	[2260, 3326]
678	[972, 1206]	1533	[1281, 1046]	2388	[2964, 2959]	3243	[2525, 2786]
679	[974, 1207]	1534	[2356, 379]	2389	[2965, 2966]	3244	[2550, 1113]
680	[1208, 456]	1535	[2357, 281]	2390	[2967, 2968]	3245	[886, 391]
681	[1209, 860]	1536	[2358, 2293]	2391	[2969, 2970]	3246	[354, 3347]

682	[1210, 1211]	1537	[2359, 998]	2392	[2971, 2972]	3247	[2362, 1399]
683	[1212, 1213]	1538	[263, 1403]	2393	[733, 520]	3248	[2451, 307]
684	[1206, 394]	1539	[855, 94]	2394	[1907, 2181]	3249	[21, 2387]
685	[1214, 1215]	1540	[1117, 1031]	2395	[2886, 2973]	3250	[1166, 995]
686	[1216, 1217]	1541	[1134, 2360]	2396	[1832, 661]	3251	[2684, 1281]
687	[1218, 1219]	1542	[2361, 341]	2397	[2974, 2975]	3252	[70, 1153]
688	[105, 424]	1543	[357, 2362]	2398	[2976, 2977]	3253	[68, 1183]
689	[16, 1220]	1544	[2363, 1077]	2399	[2191, 1764]	3254	[2590, 1066]
690	[1221, 1222]	1545	[2364, 2365]	2400	[587, 1463]	3255	[2435, 1218]
691	[1223, 1224]	1546	[2366, 315]	2401	[2978, 2979]	3256	[1389, 105]
692	[1225, 1226]	1547	[924, 2367]	2402	[2980, 2183]	3257	[2695, 2249]
693	[1160, 1227]	1548	[1187, 2368]	2403	[2981, 1999]	3258	[380, 934]
694	[944, 1228]	1549	[2369, 2370]	2404	[2122, 2982]	3259	[1243, 927]
695	[1229, 1230]	1550	[2371, 2372]	2405	[2218, 1589]	3260	[2763, 2256]
696	[1231, 283]	1551	[1150, 2373]	2406	[729, 830]	3261	[89, 1385]
697	[1232, 1233]	1552	[2374, 2375]	2407	[2983, 37]	3262	[2273, 2693]
698	[77, 1234]	1553	[2376, 2377]	2408	[45, 2984]	3263	[3332, 2566]
699	[1235, 1236]	1554	[2370, 2378]	2409	[2985, 2986]	3264	[400, 1273]
700	[455, 1237]	1555	[2379, 107]	2410	[2078, 2987]	3265	[298, 382]
701	[1238, 1239]	1556	[247, 2309]	2411	[2882, 493]	3266	[1289, 407]
702	[1240, 359]	1557	[109, 2380]	2412	[1561, 2087]	3267	[2323, 2456]
703	[1241, 910]	1558	[2381, 1366]	2413	[2988, 626]	3268	[2770, 2621]
704	[1242, 1243]	1559	[2382, 2378]	2414	[2989, 2990]	3269	[366, 1398]
705	[1244, 381]	1560	[372, 2383]	2415	[2991, 2941]	3270	[3341, 2388]
706	[1245, 1246]	1561	[2384, 2385]	2416	[2992, 1546]	3271	[2657, 294]
707	[267, 114]	1562	[2343, 2260]	2417	[609, 796]	3272	[3364, 2707]
708	[888, 1247]	1563	[2386, 2387]	2418	[2993, 1736]	3273	[1046, 2368]
709	[1248, 1249]	1564	[1078, 1027]	2419	[2994, 1666]	3274	[2333, 2666]
710	[1250, 1251]	1565	[925, 2388]	2420	[175, 2995]	3275	[1248, 2779]
711	[1252, 1253]	1566	[2389, 2390]	2421	[146, 2933]	3276	[2621, 2305]
712	[1254, 1255]	1567	[2391, 2392]	2422	[2029, 1802]	3277	[2482, 2299]
713	[1256, 244]	1568	[393, 2393]	2423	[2996, 2063]	3278	[335, 952]
714	[1257, 1258]	1569	[892, 80]	2424	[747, 2997]	3279	[1384, 90]
715	[1023, 1259]	1570	[2394, 1021]	2425	[2998, 1597]	3280	[3372, 1402]
716	[20, 416]	1571	[2395, 2316]	2426	[1909, 2169]	3281	[1298, 430]
717	[1260, 1261]	1572	[2396, 306]	2427	[2004, 2999]	3282	[3367, 1184]
718	[1262, 937]	1573	[74, 17]	2428	[2918, 2178]	3283	[923, 867]
719	[1263, 1120]	1574	[97, 2397]	2429	[2039, 683]	3284	[2622, 2544]
720	[1264, 297]	1575	[1058, 305]	2430	[476, 3000]	3285	[2237, 401]
721	[1265, 1266]	1576	[1191, 2398]	2431	[1763, 2983]	3286	[2357, 932]
722	[1267, 1268]	1577	[2399, 2400]	2432	[3001, 3002]	3287	[3358, 1413]
723	[1269, 1270]	1578	[2286, 2389]	2433	[3003, 3004]	3288	[2294, 1073]
724	[267, 1271]	1579	[2401, 2402]	2434	[2017, 3005]	3289	[256, 850]
725	[1272, 372]	1580	[2403, 1176]	2435	[2213, 1988]	3290	[1086, 2523]

726	[1273, 1274]	1581	[2404, 2405]	2436	[604, 2120]	3291	[1214, 2598]
727	[1275, 1276]	1582	[2406, 2288]	2437	[2968, 2902]	3292	[431, 1307]
728	[1277, 976]	1583	[2407, 2408]	2438	[3006, 1485]	3293	[996, 1182]
729	[952, 1278]	1584	[2409, 398]	2439	[3007, 645]	3294	[403, 101]
730	[1279, 1280]	1585	[2410, 2411]	2440	[1773, 3008]	3295	[1290, 924]
731	[1281, 1187]	1586	[2260, 314]	2441	[2107, 2967]	3296	[3346, 1009]
732	[418, 951]	1587	[80, 871]	2442	[3009, 2007]	3297	[1194, 3334]
733	[370, 1282]	1588	[1095, 2412]	2443	[1600, 3010]	3298	[2683, 1146]
734	[1258, 1283]	1589	[2413, 2414]	2444	[2950, 3011]	3299	[2436, 302]
735	[1284, 1285]	1590	[2415, 2416]	2445	[3012, 525]	3300	[2403, 432]
736	[1286, 1287]	1591	[2343, 313]	2446	[3013, 3014]	3301	[2719, 2572]
737	[1288, 1289]	1592	[1338, 2417]	2447	[177, 2103]	3302	[1057, 958]
738	[1290, 867]	1593	[443, 1154]	2448	[640, 2994]	3303	[3373, 655]
739	[1164, 409]	1594	[310, 343]	2449	[504, 1868]	3304	[154, 3374]
740	[1291, 1292]	1595	[947, 910]	2450	[1518, 1772]	3305	[570, 2059]
741	[1275, 918]	1596	[1140, 67]	2451	[3015, 2998]	3306	[2833, 1962]
742	[1175, 1293]	1597	[2254, 2418]	2452	[2874, 3016]	3307	[194, 1694]
743	[450, 1294]	1598	[1374, 1089]	2453	[3017, 203]	3308	[3375, 1723]
744	[1295, 1296]	1599	[2419, 2420]	2454	[1768, 3018]	3309	[2038, 3376]
745	[1090, 1297]	1600	[2421, 2252]	2455	[630, 147]	3310	[3377, 716]
746	[1298, 1299]	1601	[2422, 1334]	2456	[3019, 807]	3311	[3378, 3379]
747	[860, 1300]	1602	[2423, 912]	2457	[1578, 3020]	3312	[1807, 3190]
748	[1301, 1302]	1603	[999, 923]	2458	[1865, 693]	3313	[2068, 620]
749	[1303, 1158]	1604	[2424, 858]	2459	[1893, 3021]	3314	[513, 3380]
750	[1304, 1305]	1605	[1411, 2343]	2460	[3022, 3023]	3315	[3381, 1513]
751	[1306, 1089]	1606	[307, 2425]	2461	[3024, 3025]	3316	[623, 2234]
752	[1307, 6]	1607	[2426, 961]	2462	[3026, 3027]	3317	[1573, 1932]
753	[1182, 1308]	1608	[2427, 2428]	2463	[3028, 3029]	3318	[2062, 567]
754	[881, 1067]	1609	[1041, 2322]	2464	[1899, 1633]	3319	[2819, 1735]
755	[1309, 1130]	1610	[2429, 445]	2465	[3030, 3031]	3320	[3044, 1847]
756	[1037, 121]	1611	[1030, 2430]	2466	[3032, 514]	3321	[767, 1878]
757	[1310, 1199]	1612	[2431, 1005]	2467	[3033, 3034]	3322	[3382, 3383]
758	[1311, 1312]	1613	[1152, 71]	2468	[2080, 3035]	3323	[2869, 631]
759	[1313, 1067]	1614	[904, 2432]	2469	[3036, 3037]	3324	[3384, 3385]
760	[1079, 1314]	1615	[2433, 874]	2470	[3038, 3039]	3325	[2160, 3386]
761	[248, 1315]	1616	[1309, 2434]	2471	[32, 3040]	3326	[662, 3387]
762	[1222, 1316]	1617	[1178, 898]	2472	[1529, 3041]	3327	[2862, 1489]
763	[1317, 1318]	1618	[2435, 2355]	2473	[3042, 3043]	3328	[2904, 3384]
764	[1217, 1319]	1619	[2436, 446]	2474	[2110, 3044]	3329	[3163, 3109]
765	[91, 372]	1620	[2437, 2438]	2475	[1969, 241]	3330	[2127, 1644]
766	[1320, 1321]	1621	[973, 980]	2476	[1858, 1681]	3331	[3287, 2031]
767	[431, 5]	1622	[2431, 2328]	2477	[3045, 2818]	3332	[2104, 758]
768	[1322, 1323]	1623	[1273, 1084]	2478	[3046, 3047]	3333	[3388, 3389]
769	[1324, 1325]	1624	[430, 2243]	2479	[3048, 3049]	3334	[3390, 35]

770	[1326, 110]	1625	[344, 2439]	2480	[737, 3050]	3335	[531, 678]
771	[1327, 1328]	1626	[2440, 2441]	2481	[3051, 3012]	3336	[1719, 2834]
772	[1329, 1330]	1627	[2288, 448]	2482	[3052, 3053]	3337	[1727, 3104]
773	[1331, 970]	1628	[1284, 2340]	2483	[3054, 3052]	3338	[2041, 3236]
774	[1332, 1333]	1629	[2442, 1232]	2484	[2842, 3055]	3339	[3228, 3248]
775	[1334, 1335]	1630	[2443, 2444]	2485	[1678, 3056]	3340	[3188, 3391]
776	[1336, 1147]	1631	[2445, 2446]	2486	[3057, 2854]	3341	[3280, 3282]
777	[1337, 1150]	1632	[2447, 2448]	2487	[673, 3058]	3342	[3130, 3392]
778	[324, 1338]	1633	[2449, 2450]	2488	[2222, 3059]	3343	[3393, 1708]
779	[1141, 1326]	1634	[2451, 2408]	2489	[3060, 3022]	3344	[3394, 3123]
780	[1339, 1340]	1635	[2452, 2360]	2490	[3061, 3062]	3345	[3395, 3396]
781	[1302, 1341]	1636	[2453, 422]	2491	[3063, 2016]	3346	[702, 3042]
782	[1170, 1342]	1637	[2244, 423]	2492	[3064, 3065]	3347	[2970, 1636]
783	[909, 933]	1638	[349, 2454]	2493	[2235, 3066]	3348	[2859, 657]
784	[999, 1290]	1639	[2455, 1249]	2494	[1700, 3067]	3349	[3207, 1979]
785	[1343, 1344]	1640	[2456, 2457]	2495	[3068, 2988]	3350	[3200, 2948]
786	[1324, 1345]	1641	[2458, 2249]	2496	[3069, 2096]	3351	[562, 744]
787	[1209, 1118]	1642	[317, 1071]	2497	[3070, 2202]	3352	[3058, 2003]
788	[1346, 1347]	1643	[2296, 2459]	2498	[3071, 2206]	3353	[3086, 3397]
789	[1348, 1349]	1644	[1239, 2460]	2499	[537, 3072]	3354	[3398, 1902]
790	[1350, 1351]	1645	[2461, 2382]	2500	[3073, 1601]	3355	[2975, 3009]
791	[1352, 1353]	1646	[1031, 68]	2501	[3074, 3075]	3356	[2857, 3399]
792	[891, 1282]	1647	[1401, 2435]	2502	[3076, 530]	3357	[1824, 2989]
793	[1354, 1076]	1648	[2462, 2463]	2503	[474, 1670]	3358	[3010, 2839]
794	[1355, 1356]	1649	[990, 306]	2504	[3077, 2863]	3359	[3108, 3382]
795	[1357, 1358]	1650	[2464, 2465]	2505	[1869, 2176]	3360	[165, 2920]
796	[1103, 1359]	1651	[1355, 2466]	2506	[3078, 841]	3361	[216, 3400]
797	[1360, 253]	1652	[2365, 2309]	2507	[3079, 2143]	3362	[51, 633]
798	[1361, 1362]	1653	[2467, 2468]	2508	[627, 2929]	3363	[3376, 2135]
799	[1363, 1364]	1654	[2469, 2470]	2509	[829, 3080]	3364	[3401, 607]
800	[1206, 244]	1655	[2471, 2472]	2510	[2955, 787]	3365	[3115, 2964]
801	[1365, 1304]	1656	[4, 2273]	2511	[2899, 588]	3366	[546, 3375]
802	[997, 29]	1657	[2473, 2474]	2512	[3027, 721]	3367	[3402, 1584]
803	[1082, 1366]	1658	[2475, 121]	2513	[1976, 3081]	3368	[3403, 3404]
804	[1367, 1368]	1659	[338, 2476]	2514	[2817, 3082]	3369	[3405, 3393]
805	[1358, 442]	1660	[2477, 2478]	2515	[3083, 2198]	3370	[3406, 3407]
806	[1061, 1369]	1661	[1344, 1187]	2516	[3084, 3085]	3371	[3214, 2914]
807	[1370, 1371]	1662	[2479, 82]	2517	[2943, 3086]	3372	[844, 2931]
808	[1372, 1373]	1663	[278, 1090]	2518	[3016, 3087]	3373	[3408, 1174]
809	[1374, 278]	1664	[422, 1279]	2519	[3088, 3088]	3374	[302, 447]
810	[1375, 872]	1665	[1181, 997]	2520	[3089, 3090]	3375	[972, 1256]
811	[1376, 1377]	1666	[2480, 979]	2521	[3091, 3092]	3376	[3360, 2324]
812	[1378, 1379]	1667	[2407, 307]	2522	[2830, 1877]	3377	[81, 2740]
813	[1380, 1352]	1668	[1382, 2330]	2523	[1875, 2223]	3378	[994, 1142]

814	[888, 1381]	1669	[373, 2481]	2524	[3093, 3094]	3379	[2631, 2409]
815	[1382, 1383]	1670	[2482, 2483]	2525	[3095, 3096]	3380	[1401, 2635]
816	[432, 1177]	1671	[2484, 1124]	2526	[3097, 3089]	3381	[2283, 2587]
817	[1384, 1385]	1672	[956, 317]	2527	[3098, 3099]	3382	[1138, 1131]
818	[1386, 374]	1673	[2485, 2486]	2528	[3100, 3101]	3383	[2699, 3331]
819	[1387, 440]	1674	[2487, 2488]	2529	[3102, 1977]	3384	[259, 406]
820	[1388, 1174]	1675	[2489, 2490]	2530	[1667, 3097]	3385	[3342, 2671]
821	[1389, 1080]	1676	[2394, 2491]	2531	[1740, 3103]	3386	[3372, 263]
822	[960, 1270]	1677	[2492, 1340]	2532	[3104, 2118]	3387	[258, 272]
823	[1390, 355]	1678	[978, 2493]	2533	[3105, 3024]	3388	[1269, 2751]
824	[406, 1391]	1679	[2494, 2495]	2534	[3065, 3106]	3389	[1304, 1126]
825	[1392, 1393]	1680	[2496, 1362]	2535	[3107, 3108]	3390	[279, 1297]
826	[1394, 1216]	1681	[2363, 1322]	2536	[3109, 1638]	3391	[384, 2602]
827	[1395, 1396]	1682	[2416, 1076]	2537	[3110, 2057]	3392	[1380, 2741]
828	[1397, 1398]	1683	[2497, 2498]	2538	[3111, 1427]	3393	[1337, 2520]
829	[1035, 1399]	1684	[448, 1023]	2539	[3112, 3113]	3394	[2708, 2712]
830	[1033, 1324]	1685	[360, 2499]	2540	[3114, 3115]	3395	[298, 325]
831	[1278, 1338]	1686	[1262, 368]	2541	[3116, 3117]	3396	[3351, 3341]
832	[1400, 1401]	1687	[1332, 437]	2542	[238, 742]	3397	[2630, 999]
833	[1402, 1403]	1688	[967, 900]	2543	[1419, 1623]	3398	[2697, 1092]
834	[1026, 399]	1689	[2437, 2324]	2544	[3118, 3119]	3399	[890, 370]
835	[1404, 1405]	1690	[2500, 1061]	2545	[1970, 3120]	3400	[2464, 2420]
836	[898, 1406]	1691	[2501, 2502]	2546	[3121, 3122]	3401	[948, 2579]
837	[1398, 1145]	1692	[376, 2269]	2547	[3123, 467]	3402	[2306, 2410]
838	[1407, 253]	1693	[2503, 2504]	2548	[3124, 553]	3403	[2239, 1293]
839	[1408, 1409]	1694	[2505, 1057]	2549	[1861, 736]	3404	[2392, 2742]
840	[899, 968]	1695	[1277, 2506]	2550	[2224, 3125]	3405	[2637, 2347]
841	[1410, 1411]	1696	[2507, 941]	2551	[3126, 2139]	3406	[1145, 1078]
842	[1412, 1413]	1697	[2315, 2508]	2552	[2073, 536]	3407	[2561, 247]
843	[1414, 1415]	1698	[2509, 2510]	2553	[2094, 3127]	3408	[3409, 1928]
844	[1416, 1016]	1699	[2484, 2511]	2554	[3128, 3001]	3409	[3410, 2665]
845	[991, 16]	1700	[1136, 1086]	2555	[2166, 1687]	3410	[3411, 238]
846	[993, 880]	1701	[2512, 2513]	2556	[818, 3129]	3411	[3412, 1175]
847	[1417, 744]	1702	[256, 2514]	2557	[648, 3130]	3412	[3413, 634]
848	[1418, 1419]	1703	[2515, 2516]	2558	[3131, 2159]	3413	[3414, 2365]
849	[1420, 1421]	1704	[255, 849]	2559	[124, 1454]	3414	[3415, 467]
850	[479, 1422]	1705	[119, 1085]	2560	[1910, 3132]	3415	[3416, 865]
851	[1423, 1424]	1706	[248, 2517]	2561	[3133, 614]	3416	[3417, 1451]
852	[1425, 1426]	1707	[2501, 1203]	2562	[1635, 2196]	3417	[3, 2272]
853	[1427, 1428]	1708	[2518, 2519]	2563	[3000, 3134]		
854	[1429, 1430]	1709	[2520, 1151]	2564	[3135, 2852]		

Output function $n \mapsto \tau(n)$:

n	$\tau(n)$	n	$\tau(n)$	n	$\tau(n)$	n	$\tau(n)$	n	$\tau(n)$	n	$\tau(n)$
0	0	570	0	1140	1	1710	1	2280	1	2850	1
1	0	571	1	1141	0	1711	0	2281	0	2851	0
2	0	572	1	1142	1	1712	1	2282	0	2852	0
3	0	573	0	1143	0	1713	1	2283	1	2853	1
4	0	574	1	1144	0	1714	0	2284	0	2854	0
5	0	575	1	1145	1	1715	1	2285	0	2855	1
6	0	576	0	1146	0	1716	1	2286	1	2856	0
7	0	577	0	1147	1	1717	0	2287	1	2857	0
8	1	578	0	1148	1	1718	0	2288	1	2858	0
9	0	579	0	1149	0	1719	1	2289	1	2859	0
10	0	580	0	1150	1	1720	1	2290	0	2860	1
11	0	581	0	1151	0	1721	0	2291	1	2861	1
12	1	582	1	1152	0	1722	1	2292	0	2862	0
13	0	583	0	1153	0	1723	1	2293	1	2863	1
14	1	584	0	1154	0	1724	0	2294	0	2864	0
15	0	585	0	1155	1	1725	1	2295	1	2865	0
16	0	586	1	1156	1	1726	1	2296	0	2866	1
17	1	587	1	1157	1	1727	1	2297	0	2867	0
18	0	588	0	1158	0	1728	0	2298	0	2868	1
19	0	589	1	1159	0	1729	0	2299	0	2869	0
20	1	590	1	1160	0	1730	1	2300	1	2870	0
21	0	591	0	1161	0	1731	1	2301	0	2871	0
22	0	592	1	1162	1	1732	1	2302	1	2872	0
23	0	593	1	1163	0	1733	0	2303	1	2873	0
24	0	594	1	1164	1	1734	0	2304	0	2874	0
25	1	595	0	1165	0	1735	0	2305	1	2875	0
26	0	596	0	1166	1	1736	0	2306	0	2876	0
27	0	597	1	1167	1	1737	0	2307	0	2877	0
28	0	598	0	1168	0	1738	0	2308	1	2878	1
29	1	599	0	1169	0	1739	0	2309	1	2879	0
30	0	600	1	1170	0	1740	1	2310	0	2880	1
31	0	601	1	1171	1	1741	1	2311	1	2881	1
32	1	602	1	1172	1	1742	1	2312	0	2882	0
33	0	603	0	1173	0	1743	1	2313	0	2883	0
34	1	604	1	1174	0	1744	1	2314	0	2884	1
35	1	605	1	1175	0	1745	1	2315	0	2885	1
36	0	606	0	1176	0	1746	1	2316	0	2886	1
37	0	607	1	1177	1	1747	1	2317	1	2887	1
38	0	608	0	1178	0	1748	0	2318	0	2888	1
39	0	609	1	1179	1	1749	0	2319	1	2889	0
40	1	610	0	1180	1	1750	1	2320	1	2890	0
41	0	611	0	1181	1	1751	0	2321	1	2891	0
42	0	612	1	1182	1	1752	0	2322	0	2892	1

43	0	613	1	1183	1	1753	0	2323	1	2893	0
44	0	614	0	1184	1	1754	1	2324	1	2894	1
45	1	615	0	1185	0	1755	1	2325	0	2895	0
46	0	616	0	1186	0	1756	0	2326	1	2896	0
47	0	617	1	1187	0	1757	1	2327	0	2897	1
48	0	618	1	1188	1	1758	0	2328	1	2898	1
49	1	619	0	1189	1	1759	1	2329	0	2899	1
50	1	620	1	1190	1	1760	1	2330	1	2900	1
51	1	621	0	1191	0	1761	1	2331	0	2901	0
52	0	622	0	1192	0	1762	0	2332	0	2902	0
53	1	623	1	1193	1	1763	0	2333	1	2903	0
54	0	624	0	1194	0	1764	0	2334	0	2904	1
55	0	625	1	1195	1	1765	1	2335	1	2905	0
56	0	626	0	1196	0	1766	1	2336	0	2906	1
57	1	627	1	1197	1	1767	1	2337	1	2907	0
58	1	628	0	1198	1	1768	1	2338	1	2908	0
59	0	629	0	1199	1	1769	0	2339	0	2909	0
60	0	630	1	1200	1	1770	0	2340	1	2910	0
61	0	631	0	1201	0	1771	0	2341	0	2911	1
62	0	632	0	1202	1	1772	0	2342	0	2912	1
63	1	633	1	1203	1	1773	0	2343	1	2913	0
64	1	634	1	1204	1	1774	1	2344	0	2914	1
65	0	635	0	1205	1	1775	0	2345	1	2915	0
66	0	636	1	1206	1	1776	1	2346	1	2916	1
67	1	637	1	1207	0	1777	1	2347	0	2917	1
68	1	638	0	1208	0	1778	1	2348	0	2918	0
69	0	639	1	1209	0	1779	0	2349	1	2919	0
70	1	640	0	1210	0	1780	1	2350	1	2920	1
71	1	641	0	1211	1	1781	1	2351	1	2921	0
72	0	642	1	1212	1	1782	0	2352	0	2922	1
73	1	643	1	1213	1	1783	0	2353	1	2923	0
74	0	644	0	1214	1	1784	0	2354	1	2924	0
75	0	645	1	1215	0	1785	1	2355	1	2925	0
76	0	646	1	1216	1	1786	1	2356	1	2926	1
77	0	647	1	1217	0	1787	0	2357	0	2927	1
78	1	648	0	1218	0	1788	0	2358	1	2928	1
79	1	649	1	1219	1	1789	0	2359	1	2929	0
80	0	650	0	1220	0	1790	0	2360	0	2930	1
81	0	651	0	1221	1	1791	0	2361	0	2931	1
82	0	652	1	1222	1	1792	1	2362	0	2932	0
83	0	653	0	1223	0	1793	0	2363	0	2933	0
84	1	654	0	1224	0	1794	1	2364	0	2934	0
85	0	655	1	1225	1	1795	1	2365	0	2935	1
86	0	656	0	1226	0	1796	1	2366	1	2936	1

87	0	657	0	1227	1	1797	1	2367	0	2937	0
88	1	658	0	1228	0	1798	1	2368	0	2938	0
89	1	659	0	1229	1	1799	0	2369	1	2939	1
90	0	660	1	1230	1	1800	0	2370	0	2940	1
91	0	661	1	1231	1	1801	0	2371	1	2941	0
92	1	662	0	1232	1	1802	0	2372	1	2942	0
93	0	663	1	1233	1	1803	1	2373	1	2943	0
94	0	664	0	1234	0	1804	0	2374	1	2944	1
95	0	665	0	1235	0	1805	1	2375	1	2945	0
96	0	666	1	1236	0	1806	0	2376	1	2946	0
97	1	667	1	1237	1	1807	1	2377	0	2947	1
98	0	668	0	1238	1	1808	1	2378	0	2948	1
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100	1	670	1	1240	1	1810	1	2380	1	2950	0
101	1	671	0	1241	0	1811	0	2381	0	2951	1
102	1	672	0	1242	0	1812	0	2382	1	2952	1
103	0	673	1	1243	0	1813	1	2383	0	2953	1
104	0	674	1	1244	1	1814	1	2384	0	2954	1
105	1	675	0	1245	1	1815	0	2385	1	2955	0
106	0	676	1	1246	0	1816	1	2386	1	2956	0
107	0	677	1	1247	0	1817	1	2387	1	2957	0
108	1	678	1	1248	0	1818	1	2388	0	2958	0
109	0	679	0	1249	1	1819	0	2389	0	2959	0
110	0	680	0	1250	0	1820	1	2390	1	2960	0
111	0	681	0	1251	0	1821	0	2391	0	2961	1
112	1	682	0	1252	0	1822	0	2392	1	2962	1
113	1	683	1	1253	0	1823	0	2393	1	2963	1
114	0	684	1	1254	0	1824	1	2394	1	2964	0
115	1	685	1	1255	1	1825	0	2395	1	2965	0
116	0	686	1	1256	0	1826	0	2396	1	2966	0
117	0	687	0	1257	1	1827	0	2397	1	2967	1
118	0	688	1	1258	1	1828	0	2398	1	2968	0
119	0	689	0	1259	0	1829	0	2399	0	2969	0
120	1	690	1	1260	1	1830	1	2400	1	2970	1
121	0	691	0	1261	1	1831	1	2401	1	2971	1
122	0	692	1	1262	0	1832	1	2402	1	2972	0
123	0	693	0	1263	1	1833	1	2403	1	2973	0
124	1	694	1	1264	0	1834	1	2404	0	2974	1
125	1	695	1	1265	1	1835	0	2405	1	2975	1
126	1	696	1	1266	0	1836	1	2406	0	2976	1
127	1	697	1	1267	0	1837	0	2407	1	2977	1
128	1	698	0	1268	1	1838	0	2408	1	2978	1
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130	0	700	1	1270	1	1840	1	2410	1	2980	1

131	0	701	1	1271	1	1841	0	2411	0	2981	1
132	1	702	1	1272	1	1842	1	2412	0	2982	0
133	1	703	0	1273	0	1843	0	2413	0	2983	1
134	0	704	0	1274	0	1844	0	2414	1	2984	1
135	1	705	1	1275	1	1845	1	2415	0	2985	1
136	0	706	1	1276	0	1846	1	2416	1	2986	0
137	0	707	0	1277	1	1847	0	2417	1	2987	1
138	1	708	0	1278	1	1848	1	2418	1	2988	0
139	1	709	0	1279	1	1849	0	2419	0	2989	1
140	1	710	0	1280	1	1850	0	2420	0	2990	0
141	1	711	0	1281	1	1851	1	2421	1	2991	0
142	1	712	0	1282	0	1852	0	2422	1	2992	1
143	0	713	0	1283	1	1853	1	2423	1	2993	1
144	0	714	1	1284	1	1854	0	2424	1	2994	0
145	1	715	1	1285	0	1855	0	2425	1	2995	1
146	1	716	1	1286	0	1856	0	2426	1	2996	1
147	0	717	1	1287	0	1857	0	2427	1	2997	0
148	1	718	0	1288	0	1858	1	2428	0	2998	1
149	0	719	1	1289	1	1859	0	2429	0	2999	1
150	1	720	0	1290	0	1860	1	2430	0	3000	1
151	0	721	1	1291	0	1861	0	2431	0	3001	1
152	1	722	0	1292	0	1862	1	2432	1	3002	0
153	0	723	1	1293	1	1863	0	2433	0	3003	0
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155	1	725	1	1295	1	1865	1	2435	0	3005	0
156	1	726	0	1296	0	1866	1	2436	1	3006	0
157	0	727	1	1297	0	1867	1	2437	0	3007	0
158	0	728	1	1298	0	1868	0	2438	0	3008	1
159	0	729	0	1299	0	1869	1	2439	0	3009	0
160	0	730	1	1300	1	1870	0	2440	0	3010	0
161	1	731	1	1301	1	1871	0	2441	1	3011	0
162	0	732	0	1302	0	1872	1	2442	0	3012	0
163	1	733	1	1303	0	1873	1	2443	1	3013	0
164	0	734	1	1304	1	1874	1	2444	0	3014	1
165	1	735	1	1305	1	1875	1	2445	0	3015	0
166	1	736	0	1306	1	1876	1	2446	0	3016	0
167	1	737	0	1307	1	1877	0	2447	1	3017	0
168	0	738	0	1308	0	1878	1	2448	0	3018	1
169	1	739	1	1309	0	1879	1	2449	1	3019	0
170	0	740	0	1310	0	1880	1	2450	0	3020	1
171	0	741	1	1311	1	1881	0	2451	0	3021	1
172	0	742	0	1312	1	1882	0	2452	0	3022	1
173	1	743	0	1313	0	1883	0	2453	0	3023	1
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175	0	745	1	1315	1	1885	0	2455	1	3025	1
176	1	746	0	1316	0	1886	1	2456	0	3026	0
177	1	747	1	1317	1	1887	1	2457	1	3027	0
178	0	748	1	1318	1	1888	1	2458	1	3028	1
179	0	749	0	1319	0	1889	1	2459	1	3029	0
180	0	750	1	1320	1	1890	1	2460	1	3030	1
181	1	751	1	1321	1	1891	1	2461	0	3031	0
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184	0	754	1	1324	1	1894	0	2464	1	3034	0
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186	1	756	1	1326	1	1896	0	2466	0	3036	0
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189	0	759	0	1329	0	1899	1	2469	0	3039	1
190	0	760	0	1330	1	1900	1	2470	1	3040	1
191	1	761	0	1331	1	1901	1	2471	1	3041	0
192	0	762	1	1332	1	1902	0	2472	0	3042	0
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194	0	764	0	1334	1	1904	0	2474	1	3044	0
195	1	765	0	1335	0	1905	1	2475	0	3045	1
196	0	766	1	1336	1	1906	0	2476	1	3046	0
197	1	767	0	1337	0	1907	1	2477	1	3047	0
198	1	768	0	1338	1	1908	0	2478	0	3048	1
199	1	769	1	1339	1	1909	1	2479	1	3049	0
200	0	770	1	1340	0	1910	1	2480	0	3050	0
201	1	771	0	1341	1	1911	1	2481	0	3051	0
202	1	772	0	1342	0	1912	1	2482	1	3052	1
203	0	773	1	1343	0	1913	0	2483	1	3053	1
204	0	774	1	1344	0	1914	1	2484	0	3054	1
205	0	775	1	1345	1	1915	1	2485	1	3055	0
206	1	776	1	1346	1	1916	0	2486	1	3056	0
207	1	777	0	1347	1	1917	1	2487	1	3057	1
208	1	778	0	1348	0	1918	0	2488	1	3058	1
209	0	779	0	1349	1	1919	0	2489	0	3059	0
210	1	780	1	1350	0	1920	0	2490	1	3060	0
211	0	781	0	1351	1	1921	1	2491	1	3061	1
212	1	782	0	1352	0	1922	1	2492	0	3062	0
213	1	783	1	1353	1	1923	1	2493	0	3063	1
214	1	784	0	1354	0	1924	0	2494	0	3064	0
215	0	785	0	1355	1	1925	1	2495	1	3065	1
216	1	786	1	1356	1	1926	0	2496	1	3066	0
217	0	787	0	1357	0	1927	0	2497	0	3067	1
218	0	788	1	1358	0	1928	0	2498	1	3068	1

219	0	789	0	1359	0	1929	0	2499	0	3069	1
220	1	790	0	1360	1	1930	0	2500	1	3070	0
221	1	791	0	1361	0	1931	1	2501	0	3071	1
222	0	792	0	1362	0	1932	1	2502	0	3072	1
223	1	793	0	1363	0	1933	1	2503	1	3073	1
224	0	794	1	1364	0	1934	0	2504	1	3074	0
225	0	795	0	1365	0	1935	1	2505	1	3075	1
226	1	796	0	1366	0	1936	1	2506	0	3076	0
227	1	797	1	1367	0	1937	1	2507	1	3077	1
228	0	798	0	1368	0	1938	1	2508	1	3078	0
229	0	799	0	1369	1	1939	1	2509	1	3079	1
230	0	800	1	1370	0	1940	1	2510	0	3080	1
231	0	801	0	1371	0	1941	0	2511	1	3081	1
232	0	802	0	1372	0	1942	1	2512	0	3082	0
233	0	803	1	1373	0	1943	0	2513	0	3083	1
234	0	804	0	1374	0	1944	0	2514	1	3084	1
235	0	805	0	1375	0	1945	0	2515	1	3085	0
236	0	806	0	1376	0	1946	1	2516	1	3086	0
237	1	807	0	1377	1	1947	0	2517	0	3087	1
238	0	808	0	1378	0	1948	0	2518	0	3088	1
239	0	809	0	1379	0	1949	1	2519	1	3089	0
240	0	810	0	1380	0	1950	1	2520	0	3090	0
241	0	811	0	1381	1	1951	1	2521	0	3091	0
242	1	812	0	1382	1	1952	1	2522	0	3092	0
243	0	813	0	1383	0	1953	1	2523	1	3093	0
244	1	814	0	1384	0	1954	0	2524	0	3094	0
245	1	815	1	1385	1	1955	0	2525	1	3095	1
246	1	816	1	1386	1	1956	0	2526	0	3096	1
247	1	817	0	1387	0	1957	1	2527	1	3097	0
248	0	818	1	1388	1	1958	1	2528	1	3098	1
249	1	819	0	1389	0	1959	1	2529	1	3099	1
250	1	820	1	1390	1	1960	0	2530	1	3100	1
251	1	821	0	1391	0	1961	1	2531	1	3101	0
252	1	822	0	1392	1	1962	1	2532	0	3102	1
253	1	823	1	1393	0	1963	1	2533	0	3103	1
254	0	824	1	1394	0	1964	1	2534	1	3104	0
255	0	825	1	1395	0	1965	0	2535	1	3105	0
256	0	826	0	1396	0	1966	1	2536	0	3106	0
257	0	827	0	1397	1	1967	1	2537	1	3107	1
258	1	828	1	1398	1	1968	1	2538	1	3108	0
259	0	829	1	1399	1	1969	0	2539	0	3109	0
260	1	830	1	1400	0	1970	1	2540	0	3110	1
261	0	831	1	1401	0	1971	0	2541	0	3111	1
262	1	832	0	1402	1	1972	0	2542	0	3112	0

263	0	833	1	1403	0	1973	0	2543	1	3113	0
264	0	834	0	1404	1	1974	0	2544	0	3114	0
265	1	835	1	1405	0	1975	1	2545	1	3115	0
266	1	836	1	1406	1	1976	0	2546	1	3116	0
267	0	837	1	1407	0	1977	1	2547	1	3117	0
268	0	838	0	1408	1	1978	0	2548	1	3118	0
269	1	839	1	1409	0	1979	1	2549	0	3119	1
270	0	840	0	1410	1	1980	1	2550	1	3120	0
271	0	841	1	1411	1	1981	1	2551	0	3121	1
272	1	842	1	1412	1	1982	0	2552	1	3122	1
273	1	843	1	1413	0	1983	0	2553	1	3123	1
274	1	844	0	1414	1	1984	1	2554	1	3124	1
275	0	845	0	1415	1	1985	0	2555	1	3125	0
276	1	846	1	1416	0	1986	1	2556	1	3126	0
277	1	847	0	1417	0	1987	1	2557	0	3127	1
278	1	848	0	1418	0	1988	1	2558	0	3128	1
279	0	849	1	1419	1	1989	0	2559	1	3129	1
280	1	850	0	1420	1	1990	1	2560	1	3130	0
281	1	851	1	1421	1	1991	0	2561	1	3131	0
282	0	852	1	1422	1	1992	1	2562	0	3132	0
283	0	853	1	1423	1	1993	0	2563	1	3133	1
284	0	854	1	1424	1	1994	0	2564	0	3134	0
285	0	855	1	1425	1	1995	0	2565	0	3135	0
286	1	856	0	1426	0	1996	1	2566	1	3136	1
287	1	857	0	1427	1	1997	0	2567	0	3137	0
288	0	858	0	1428	1	1998	1	2568	0	3138	1
289	0	859	1	1429	1	1999	0	2569	0	3139	0
290	1	860	1	1430	1	2000	0	2570	1	3140	1
291	1	861	1	1431	1	2001	1	2571	1	3141	1
292	1	862	0	1432	1	2002	0	2572	1	3142	1
293	0	863	0	1433	1	2003	1	2573	0	3143	1
294	0	864	1	1434	0	2004	1	2574	1	3144	1
295	1	865	0	1435	1	2005	1	2575	1	3145	0
296	1	866	1	1436	0	2006	0	2576	0	3146	0
297	0	867	1	1437	1	2007	1	2577	0	3147	1
298	0	868	1	1438	1	2008	0	2578	1	3148	0
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300	0	870	1	1440	0	2010	1	2580	1	3150	0
301	0	871	1	1441	1	2011	0	2581	0	3151	1
302	1	872	1	1442	0	2012	0	2582	1	3152	1
303	1	873	1	1443	0	2013	0	2583	1	3153	1
304	1	874	0	1444	1	2014	0	2584	1	3154	1
305	0	875	1	1445	0	2015	0	2585	0	3155	0
306	1	876	1	1446	1	2016	1	2586	0	3156	1

307	0	877	0	1447	1	2017	0	2587	1	3157	1
308	0	878	0	1448	1	2018	0	2588	0	3158	1
309	0	879	0	1449	0	2019	1	2589	1	3159	1
310	1	880	1	1450	0	2020	0	2590	1	3160	0
311	0	881	1	1451	1	2021	0	2591	1	3161	0
312	1	882	1	1452	1	2022	0	2592	0	3162	1
313	0	883	1	1453	1	2023	0	2593	0	3163	1
314	1	884	0	1454	1	2024	1	2594	1	3164	0
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317	0	887	0	1457	1	2027	0	2597	0	3167	1
318	0	888	0	1458	0	2028	1	2598	1	3168	1
319	1	889	1	1459	1	2029	1	2599	1	3169	1
320	0	890	1	1460	1	2030	1	2600	0	3170	1
321	0	891	0	1461	1	2031	0	2601	0	3171	0
322	1	892	0	1462	0	2032	0	2602	0	3172	0
323	1	893	1	1463	1	2033	0	2603	1	3173	1
324	0	894	0	1464	0	2034	0	2604	0	3174	0
325	1	895	1	1465	1	2035	0	2605	1	3175	0
326	0	896	1	1466	1	2036	0	2606	1	3176	1
327	1	897	1	1467	0	2037	0	2607	1	3177	1
328	0	898	1	1468	1	2038	0	2608	1	3178	0
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330	1	900	0	1470	0	2040	1	2610	0	3180	0
331	1	901	1	1471	1	2041	0	2611	0	3181	1
332	0	902	0	1472	0	2042	0	2612	1	3182	1
333	0	903	1	1473	0	2043	0	2613	1	3183	1
334	0	904	1	1474	0	2044	1	2614	0	3184	1
335	0	905	1	1475	0	2045	0	2615	0	3185	1
336	0	906	0	1476	1	2046	1	2616	1	3186	0
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338	1	908	0	1478	1	2048	0	2618	1	3188	1
339	0	909	1	1479	1	2049	0	2619	1	3189	1
340	1	910	0	1480	0	2050	0	2620	1	3190	1
341	1	911	1	1481	0	2051	0	2621	0	3191	1
342	0	912	1	1482	0	2052	0	2622	1	3192	0
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346	1	916	1	1486	0	2056	1	2626	1	3196	0
347	0	917	0	1487	0	2057	1	2627	1	3197	1
348	0	918	1	1488	1	2058	1	2628	1	3198	1
349	1	919	1	1489	1	2059	0	2629	1	3199	1
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351	0	921	0	1491	1	2061	0	2631	1	3201	0
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353	1	923	1	1493	0	2063	1	2633	1	3203	1
354	0	924	0	1494	1	2064	0	2634	0	3204	0
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356	0	926	1	1496	1	2066	1	2636	0	3206	0
357	1	927	1	1497	1	2067	0	2637	0	3207	1
358	0	928	0	1498	1	2068	1	2638	1	3208	0
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360	1	930	0	1500	0	2070	1	2640	0	3210	0
361	1	931	1	1501	1	2071	0	2641	0	3211	1
362	0	932	0	1502	1	2072	0	2642	1	3212	0
363	0	933	1	1503	0	2073	1	2643	1	3213	1
364	1	934	1	1504	1	2074	0	2644	1	3214	1
365	1	935	1	1505	0	2075	0	2645	1	3215	1
366	0	936	0	1506	0	2076	0	2646	0	3216	0
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368	0	938	1	1508	0	2078	1	2648	1	3218	1
369	0	939	1	1509	0	2079	1	2649	0	3219	1
370	1	940	1	1510	1	2080	1	2650	0	3220	0
371	1	941	1	1511	1	2081	0	2651	0	3221	0
372	0	942	0	1512	1	2082	0	2652	0	3222	0
373	0	943	0	1513	1	2083	0	2653	0	3223	0
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569	1	1139	1	1709	0	2279	0	2849	1		

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