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

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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 $(a,b)=(z^2+1, z^4+z^3+z^2+z+1)$.

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 $(a,b)=(z^2+1, z^4+z^3+z^2+z+1)$, 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 $\mathrm{CF}(a,b)$,

$$\begin{aligned}
p_0(z) &= z^{18}+z^{17}+z^{15}+z^{14}+z^9+z^7+z^5+z^4+z^2+z+1,\\
p_1(z) &= z^{22}+z^{19}+z^{18}+z^{16}+z^{15}+z^{14}+z^{11}+z^6+z^5+z^3+z^2+z,\\
p_2(z) &= z^{24}+z^{16}+z^{14}+z^{12}+z^{10}+z^6+z^2+1,\\
p_3(z) &= z^{22}+z^{19}+z^{18}+z^{16}+z^{15}+z^{14}+z^{11}+z^6+z^5+z^3+z^2+z,\\
p_4(z) &= z^{20}+z^{18}+z^{17}+z^{15}+z^{10}+z^9+z^7+z^6+z^5+z^4+z+1,
\end{aligned}$$

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

$$\begin{aligned}
p_0(z) &= z^{18}+z^{17}+z^{16}+z^{15}+z^{14}+z^{12}+z^9+z^7+z^5+z^2+z+1,\\
p_1(z) &= z^{22}+z^{19}+z^{18}+z^{16}+z^{15}+z^{14}+z^{11}+z^6+z^5+z^3+z^2+z,\\
p_2(z) &= z^{24}+z^{16}+z^{14}+z^{12}+z^{10}+z^6+z^2+1,\\
p_3(z) &= z^{22}+z^{19}+z^{18}+z^{16}+z^{15}+z^{14}+z^{11}+z^6+z^5+z^3+z^2+z,\\
p_4(z) &= z^{20}+z^{18}+z^{17}+z^{16}+z^{15}+z^{12}+z^{10}+z^9+z^7+z^6+z^5+z+1.
\end{aligned}$$

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

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

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

$$(150, 150, 150, 150, 150)$$

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 540 and substitute it for y in $Q(x,y)$. We get a series of valuation less than 540, 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 660 and substitute it for y in $Q(x,y)$. We get a series of valuation less than 660, 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.*

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

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

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

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

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 $u = 2^{2k}$,

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

The proof of the other 15 cases are similar. We break down the above identity into 6 parts:

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

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

which can be rewritten as

$$0 = T[[w]_2] + T[[10w]_2] + T[[101w]_2] + T[[110w]_2], \tag{2.7}$$

$$0 = T[[w]_2] + T[[1w]_2] + T[[10w]_2] + T[[11w]_2] + T[[101w]_2] + T[[111w]_2], \tag{2.8}$$

$$0 = T[[1w]_2] + T[[11w]_2] + T[[100w]_2] + T[[101w]_2] + T[[1000w]_2], \tag{2.9}$$

$$0 = T[[100w]_2] + T[[1001w]_2], \tag{2.10}$$

$$0 = T[[w]_2] + T[[101w]_2] + T[[1010w]_2], \tag{2.11}$$

$$0 = T[[w]_2] + T[[1w]_2] + T[[10w]_2] + T[[101w]_2] + T[[1011w]_2], \tag{2.12}$$

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

$$1 = T[[w]_2] + T[[10w]_2] + T[[101w]_2] + T[[110w]_2], \tag{2.13}$$

$$1 = T[[w]_2] + T[[1w]_2] + T[[10w]_2] + T[[11w]_2] + T[[101w]_2] + T[[111w]_2], \tag{2.14}$$

$$1 = T[[1w]_2] + T[[11w]_2] + T[[100w]_2] + T[[101w]_2] + T[[1000w]_2], \tag{2.15}$$

$$1 = T[[100w]_2] + T[[1001w]_2], \tag{2.16}$$

$$0 = T[[w]_2] + T[[101w]_2] + T[[1010w]_2], \tag{2.17}$$

$$1 = T[[w]_2] + T[[1w]_2] + T[[10w]_2] + T[[101w]_2] + T[[1011w]_2], \tag{2.18}$$

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

First we calculate an 2-automaton that generates T from its minimal polynomial and its first terms. This automaton has 3082 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 (2.18) can be written as

$$0 = \tau(A(s,\epsilon)) + \tau(A(s,10)) + \tau(A(s,101)) + \tau(A(s,110)), \tag{2.19}$$

$$0 = \tau(A(s,\epsilon)) + \tau(A(s,1)) + \tau(A(s,10)) + \tau(A(s,11)) + \tau(A(s,101)) + \tau(A(s,111)), \tag{2.20}$$

$$0 = \tau(A(s,1)) + \tau(A(s,11)) + \tau(A(s,100)) + \tau(A(s,101)) + \tau(A(s,1000)), \tag{2.21}$$

$$0 = \tau(A(s,100)) + \tau(A(s,1001)), \tag{2.22}$$

$$0 = \tau(A(s,\epsilon)) + \tau(A(s,101)) + \tau(A(s,1010)), \tag{2.23}$$

$$0 = \tau(A(s,\epsilon)) + \tau(A(s,1)) + \tau(A(s,10)) + \tau(A(s,101)) + \tau(A(s,1011)), \tag{2.24}$$

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

$$1 = \tau(A(s,\epsilon)) + \tau(A(s,10)) + \tau(A(s,101)) + \tau(A(s,110)), \tag{2.25}$$

$$\begin{aligned}
1 &= \tau(A(s,\epsilon)) + \tau(A(s,1)) + \tau(A(s,10)) + \tau(A(s,11)) + \tau(A(s,101)) \\
&\quad + \tau(A(s,111)), \qquad (2.26)\\
1 &= \tau(A(s,1)) + \tau(A(s,11)) + \tau(A(s,100)) + \tau(A(s,101)) \\
&\quad + \tau(A(s,1000)), \qquad (2.27)\\
1 &= \tau(A(s,100)) + \tau(A(s,1001)), \qquad (2.28)\\
0 &= \tau(A(s,\epsilon)) + \tau(A(s,101)) + \tau(A(s,1010)), \qquad (2.29)\\
1 &= \tau(A(s,\epsilon)) + \tau(A(s,1)) + \tau(A(s,10)) + \tau(A(s,101)) \\
&\quad + \tau(A(s,1011)), \qquad (2.30)
\end{aligned}$$

for $s = A(i, 0^{2k})$. We find that $(A(i, 0^{26}), E_{26}) = (A(i, 0^{24}), E_{24})$, so that we only have to verify that identities (2.19) through (2.30) hold for $2 \le k \le 13$, 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 $k \ge 2$, and $u = 2^{2k-1}$,*

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

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

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

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 $n \ge 2$, 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

$$\begin{aligned}
W_{2k} M_{2k} &= \big(W^e[{:}\,6v] + x^v W^e[{:}\,5v] + x^{4v} W^e[{:}\,2v] + x^{6u} R^e\big) \times \big(M^e[{:}\,6v]\\
&\qquad + x^v M^e[{:}\,5v] + x^{4v} M^e[{:}\,2v] + x^{6u} R^e\big); \qquad (2.31)
\end{aligned}$$

Call this expression lhs. Note that both sides of identity M_{2k+1} have the same term of highest degree $x^{12v} R^o$. Therefore we only need to prove that their difference is $O(x^{12v})$. Using Lemma 2.1 it can be seen that the right side of identity M_{2k+1} is congruent, modulo x^{12v}, to

$$W^e[{:}\,12v] M^e[{:}\,12v] + x^{2v} W^e[{:}\,10v] M^e[{:}\,10v] + x^{8v} W^e[{:}\,4v] M^e[{:}\,4v].$$

For all $n \le 12$, 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

$$X := x^v,$$

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

Using the notation introduced above, we can represent the expressions lhs (2.31) and rhs as polynomials in $\mathbb{F}_2[a_1, ..., a_{12}, b_1, ..., b_{12}, c][X]$. 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 $O(X^{12})$, 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 $0 \le j, k \le 1$,

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

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

$$\begin{aligned} q_0(x) &= x^{24} + x^{23} + x^{22} + x^{20} + x^{19} + x^{17} + x^{15} + x^{10} + x^9 + x^7 + x^6, \\ q_1(x) &= x^{23} + x^{22} + x^{21} + x^{19} + x^{18} + x^{13} + x^{10} + x^9 + x^8 + x^6 + x^5 + x^2, \\ q_2(x) &= x^{24} + x^{22} + x^{18} + x^{14} + x^{12} + x^{10} + x^8 + 1, \\ q_3(x) &= x^{23} + x^{22} + x^{21} + x^{19} + x^{18} + x^{13} + x^{10} + x^9 + x^8 + x^6 + x^5 + x^2, \\ q_4(x) &= x^{24} + x^{23} + x^{20} + x^{19} + x^{18} + x^{17} + x^{15} + x^{14} + x^9 + x^7 + x^6 + x^4. \end{aligned}$$

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 186, and substitute it for y in $R(z, y)$, we get a series with valuation smaller than 186, 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 $\phi(M^e, 0, 0)$:

$$\begin{aligned}
p_0(x) &= x^{132} + x^{130} + x^{120} + x^{118} + x^{116} + x^{110} + x^{108} + x^{104} + x^{102} + x^{98} \\
&\quad + x^{96} + x^{94} + x^{92} + x^{88} + x^{86} + x^{78} + x^{74} + x^{66} + x^{64} + x^{54} + x^{48} \\
&\quad + x^{46} + x^{44} + x^{42} + x^{36} + x^{30} + x^{24}, \\
p_3(x) &= x^{130} + x^{126} + x^{124} + x^{122} + x^{118} + x^{112} + x^{110} + x^{108} + x^{106} + x^{104} \\
&\quad + x^{102} + x^{100} + x^{96} + x^{94} + x^{92} + x^{90} + x^{88} + x^{86} + x^{82} + x^{76} + x^{64} \\
&\quad + x^{60} + x^{52} + x^{50} + x^{46} + x^{40} + x^{34} + x^{32} + x^{24} + x^{22} + x^{20} + x^{18}, \\
p_6(x) &= x^{130} + x^{128} + x^{126} + x^{124} + x^{118} + x^{102} + x^{94} + x^{92} + x^{88} + x^{84} \\
&\quad + x^{78} + x^{76} + x^{74} + x^{68} + x^{66} + x^{62} + x^{50} + x^{44} + x^{38} + x^{30} + x^{24} \\
&\quad + x^{20} + x^{18} + x^{16} + x^{12} + x^{10} + x^{8} + 1, \\
p_9(x) &= x^{130} + x^{122} + x^{118} + x^{114} + x^{112} + x^{108} + x^{106} + x^{104} + x^{102} + x^{98} \\
&\quad + x^{96} + x^{94} + x^{86} + x^{80} + x^{78} + x^{72} + x^{68} + x^{66} + x^{60} + x^{52} + x^{48} \\
&\quad + x^{46} + x^{42} + x^{36} + x^{34} + x^{32} + x^{28} + x^{22} + x^{18} + x^{14} + x^{10} + x^{4}, \\
p_{12}(x) &= x^{132} + x^{128} + x^{124} + x^{120} + x^{116} + x^{112} + x^{108} + x^{104} + x^{100} + x^{96} \\
&\quad + x^{84} + x^{80} + x^{76} + x^{72} + x^{52} + x^{48} + x^{36} + x^{32} + x^{12} + x^{8} + x^{4} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{126} + x^{125} + x^{123} + x^{118} + x^{117} + x^{116} + x^{115} + x^{113} + x^{112} + x^{111} \\
&\quad + x^{110} + x^{109} + x^{107} + x^{105} + x^{104} + x^{101} + x^{100} + x^{99} + x^{98} + x^{91} \\
&\quad + x^{90} + x^{89} + x^{87} + x^{86} + x^{84} + x^{83} + x^{78} + x^{77} + x^{75} + x^{71} + x^{70} \\
&\quad + x^{68} + x^{67} + x^{66} + x^{65} + x^{64} + x^{60} + x^{59} + x^{58} + x^{57} + x^{56} + x^{54} \\
&\quad + x^{53} + x^{50} + x^{48} + x^{47} + x^{46} + x^{44} + x^{40} + x^{38} + x^{37} + x^{35} + x^{34} \\
&\quad + x^{32} + x^{30}, \\
p_3(x) &= x^{117} + x^{114} + x^{113} + x^{112} + x^{111} + x^{109} + x^{108} + x^{107} + x^{104} + x^{102} \\
&\quad + x^{101} + x^{100} + x^{99} + x^{97} + x^{96} + x^{95} + x^{92} + x^{90} + x^{88} + x^{86} + x^{85} \\
&\quad + x^{84} + x^{83} + x^{81} + x^{80} + x^{79} + x^{76} + x^{74} + x^{72} + x^{70} + x^{69} + x^{68} \\
&\quad + x^{67} + x^{65} + x^{64} + x^{63} + x^{60} + x^{58} + x^{56} + x^{54} + x^{52} + x^{51} + x^{50} \\
&\quad + x^{43} + x^{41} + x^{40} + x^{39} + x^{37} + x^{36} + x^{35} + x^{32} + x^{30} + x^{28} + x^{27} \\
&\quad + x^{26} + x^{21} + x^{19} + x^{18}, \\
p_6(x) &= x^{120} + x^{119} + x^{118} + x^{117} + x^{116} + x^{114} + x^{113} + x^{112} + x^{111} + x^{110} \\
&\quad + x^{106} + x^{105} + x^{102} + x^{100} + x^{98} + x^{95} + x^{93} + x^{89} + x^{87} + x^{83}
\end{aligned}$$

$$
\begin{aligned}
&+ x^{82} + x^{80} + x^{79} + x^{76} + x^{74} + x^{72} + x^{69} + x^{67} + x^{64} + x^{62} + x^{59}\\
&+ x^{57} + x^{54} + x^{51} + x^{50} + x^{38} + x^{37} + x^{34} + x^{31} + x^{30} + x^{28} + x^{27}\\
&+ x^{24} + x^{21} + x^{19} + x^{16} + x^{13} + x^{12},\\
p_9(x) = {}& x^{123} + x^{121} + x^{120} + x^{111} + x^{109} + x^{108} + x^{105} + x^{103} + x^{102} + x^{101}\\
&+ x^{99} + x^{98} + x^{95} + x^{92} + x^{90} + x^{89} + x^{88} + x^{85} + x^{82} + x^{81} + x^{80}\\
&+ x^{75} + x^{73} + x^{72} + x^{71} + x^{69} + x^{68} + x^{65} + x^{63} + x^{62} + x^{61} + x^{58}\\
&+ x^{56} + x^{54} + x^{53} + x^{52} + x^{45} + x^{43} + x^{42} + x^{33} + x^{30} + x^{28} + x^{27}\\
&+ x^{26} + x^{19} + x^{16} + x^{14} + x^{13} + x^{12} + x^{9} + x^{7} + x^{6},\\
p_{12}(x) = {}& x^{126} + x^{125} + x^{122} + x^{120} + x^{117} + x^{116} + x^{106} + x^{105} + x^{102} + x^{100}\\
&+ x^{97} + x^{96} + x^{78} + x^{77} + x^{74} + x^{72} + x^{69} + x^{68} + x^{62} + x^{61} + x^{57}\\
&+ x^{56} + x^{54} + x^{53} + x^{49} + x^{48} + x^{46} + x^{45} + x^{41} + x^{40} + x^{38} + x^{37}\\
&+ x^{33} + x^{32} + x^{30} + x^{29} + x^{25} + x^{24} + x^{22} + x^{21} + x^{17} + x^{16} + x^{10}\\
&+ x^{9} + x^{6} + x^{4} + x + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) = {}& x^{126} + x^{125} + x^{123} + x^{118} + x^{117} + x^{116} + x^{115} + x^{113} + x^{112} + x^{111}\\
&+ x^{110} + x^{109} + x^{107} + x^{105} + x^{104} + x^{101} + x^{100} + x^{99} + x^{98} + x^{91}\\
&+ x^{90} + x^{89} + x^{87} + x^{86} + x^{84} + x^{83} + x^{78} + x^{77} + x^{75} + x^{71} + x^{70}\\
&+ x^{68} + x^{67} + x^{66} + x^{65} + x^{64} + x^{60} + x^{59} + x^{58} + x^{57} + x^{56} + x^{54}\\
&+ x^{53} + x^{50} + x^{48} + x^{47} + x^{46} + x^{44} + x^{40} + x^{38} + x^{37} + x^{35} + x^{34}\\
&+ x^{32} + x^{30},\\
p_3(x) = {}& x^{117} + x^{114} + x^{113} + x^{112} + x^{111} + x^{109} + x^{108} + x^{107} + x^{104} + x^{102}\\
&+ x^{101} + x^{100} + x^{99} + x^{97} + x^{96} + x^{95} + x^{92} + x^{90} + x^{88} + x^{86} + x^{85}\\
&+ x^{84} + x^{83} + x^{81} + x^{80} + x^{79} + x^{76} + x^{74} + x^{72} + x^{70} + x^{69} + x^{68}\\
&+ x^{67} + x^{65} + x^{64} + x^{63} + x^{60} + x^{58} + x^{56} + x^{54} + x^{52} + x^{51} + x^{50}\\
&+ x^{43} + x^{41} + x^{40} + x^{39} + x^{37} + x^{36} + x^{35} + x^{32} + x^{30} + x^{28} + x^{27}\\
&+ x^{26} + x^{21} + x^{19} + x^{18},\\
p_6(x) = {}& x^{120} + x^{119} + x^{118} + x^{117} + x^{116} + x^{114} + x^{113} + x^{112} + x^{111} + x^{110}\\
&+ x^{106} + x^{105} + x^{102} + x^{100} + x^{98} + x^{95} + x^{93} + x^{89} + x^{87} + x^{83}\\
&+ x^{82} + x^{80} + x^{79} + x^{76} + x^{74} + x^{72} + x^{69} + x^{67} + x^{64} + x^{62} + x^{59}\\
&+ x^{57} + x^{54} + x^{51} + x^{50} + x^{38} + x^{37} + x^{34} + x^{31} + x^{30} + x^{28} + x^{27}\\
&+ x^{24} + x^{21} + x^{19} + x^{16} + x^{13} + x^{12},\\
p_9(x) = {}& x^{123} + x^{121} + x^{120} + x^{111} + x^{109} + x^{108} + x^{105} + x^{103} + x^{102} + x^{101}\\
&+ x^{99} + x^{98} + x^{95} + x^{92} + x^{90} + x^{89} + x^{88} + x^{85} + x^{82} + x^{81} + x^{80}\\
&+ x^{75} + x^{73} + x^{72} + x^{71} + x^{69} + x^{68} + x^{65} + x^{63} + x^{62} + x^{61} + x^{58}
\end{aligned}
$$

$$+ x^{56} + x^{54} + x^{53} + x^{52} + x^{45} + x^{43} + x^{42} + x^{33} + x^{30} + x^{28} + x^{27} + x^{26} + x^{19} + x^{16} + x^{14} + x^{13} + x^{12} + x^{9} + x^{7} + x^{6},$$

$$\begin{aligned} p_{12}(x) = {} & x^{126} + x^{125} + x^{122} + x^{120} + x^{117} + x^{116} + x^{106} + x^{105} + x^{102} + x^{100} \\ & + x^{97} + x^{96} + x^{78} + x^{77} + x^{74} + x^{72} + x^{69} + x^{68} + x^{62} + x^{61} + x^{57} \\ & + x^{56} + x^{54} + x^{53} + x^{49} + x^{48} + x^{46} + x^{45} + x^{41} + x^{40} + x^{38} + x^{37} \\ & + x^{33} + x^{32} + x^{30} + x^{29} + x^{25} + x^{24} + x^{22} + x^{21} + x^{17} + x^{16} + x^{10} \\ & + x^{9} + x^{6} + x^{4} + x + 1, \end{aligned}$$

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

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

$$\begin{aligned} p_0(x) = {} & x^{120} + x^{114} + x^{112} + x^{110} + x^{106} + x^{104} + x^{102} + x^{98} + x^{94} + x^{90} \\ & + x^{84} + x^{82} + x^{80} + x^{76} + x^{74} + x^{72} + x^{68} + x^{60} + x^{56} + x^{44} + x^{42} \\ & + x^{40} + x^{36}, \\ p_3(x) = {} & x^{118} + x^{116} + x^{108} + x^{106} + x^{104} + x^{102} + x^{96} + x^{94} + x^{86} + x^{84} \\ & + x^{78} + x^{64} + x^{56} + x^{46} + x^{44} + x^{42} + x^{36} + x^{34} + x^{24} + x^{22} + x^{18} \\ & + x^{16} + x^{14} + x^{12}, \\ p_6(x) = {} & x^{118} + x^{116} + x^{112} + x^{106} + x^{104} + x^{96} + x^{88} + x^{86} + x^{82} + x^{80} + x^{78} \\ & + x^{74} + x^{70} + x^{68} + x^{60} + x^{54} + x^{52} + x^{50} + x^{42} + x^{40} + x^{28} + x^{26} \\ & + x^{18} + x^{16} + x^{14} + x^{12} + x^{2} + 1, \\ p_9(x) = {} & x^{118} + x^{116} + x^{110} + x^{104} + x^{92} + x^{88} + x^{86} + x^{84} + x^{80} + x^{78} + x^{76} \\ & + x^{74} + x^{72} + x^{68} + x^{58} + x^{52} + x^{50} + x^{48} + x^{42} + x^{40} + x^{28} + x^{22} \\ & + x^{20} + x^{18} + x^{12} + x^{10} + x^{6} + x^{4}, \\ p_{12}(x) = {} & x^{120} + x^{118} + x^{116} + x^{114} + x^{112} + x^{104} + x^{102} + x^{100} + x^{98} + x^{96} \\ & + x^{72} + x^{70} + x^{68} + x^{66} + x^{64} + x^{8} + x^{6} + x^{4} + x^{2} + 1, \end{aligned}$$

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

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

$$\begin{aligned} p_0(x) = {} & x^{120} + x^{116} + x^{112} + x^{108} + x^{106} + x^{104} + x^{102} + x^{96} + x^{94} + x^{88} \\ & + x^{84} + x^{82} + x^{78} + x^{70} + x^{68} + x^{62} + x^{60} + x^{50} + x^{46} + x^{42} + x^{40} \\ & + x^{36} + x^{30} + x^{26} + x^{24}, \\ p_3(x) = {} & x^{118} + x^{116} + x^{114} + x^{110} + x^{104} + x^{102} + x^{100} + x^{94} + x^{92} + x^{90} \\ & + x^{88} + x^{86} + x^{84} + x^{82} + x^{76} + x^{74} + x^{68} + x^{62} + x^{60} + x^{56} + x^{54} \\ & + x^{48} + x^{46} + x^{42} + x^{40} + x^{38} + x^{34} + x^{26} + x^{24} + x^{22} + x^{20} + x^{18}, \\ p_6(x) = {} & x^{118} + x^{112} + x^{110} + x^{104} + x^{102} + x^{88} + x^{82} + x^{80} + x^{68} + x^{60} + x^{58} \\ & + x^{54} + x^{44} + x^{42} + x^{40} + x^{34} + x^{32} + x^{26} + x^{24} + x^{22} + x^{18} + x^{16} \\ & + x^{14} + x^{12} + x^{10} + x^{8} + x^{2} + 1, \\ p_9(x) = {} & x^{118} + x^{116} + x^{110} + x^{104} + x^{92} + x^{88} + x^{86} + x^{84} + x^{80} + x^{78} + x^{76} \end{aligned}$$

$$
\begin{aligned}
&+x^{74}+x^{72}+x^{68}+x^{58}+x^{52}+x^{50}+x^{48}+x^{42}+x^{40}+x^{28}+x^{22}\\
&+x^{20}+x^{18}+x^{12}+x^{10}+x^{6}+x^{4},\\
p_{12}(x)=&\,x^{120}+x^{118}+x^{116}+x^{114}+x^{112}+x^{104}+x^{102}+x^{100}+x^{98}+x^{96}\\
&+x^{72}+x^{70}+x^{68}+x^{66}+x^{64}+x^{8}+x^{6}+x^{4}+x^{2}+1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x)=&\,x^{126}+x^{125}+x^{123}+x^{120}+x^{119}+x^{116}+x^{113}+x^{112}+x^{111}+x^{110}\\
&+x^{109}+x^{107}+x^{106}+x^{105}+x^{104}+x^{103}+x^{100}+x^{99}+x^{97}+x^{96}\\
&+x^{95}+x^{91}+x^{90}+x^{89}+x^{88}+x^{86}+x^{85}+x^{84}+x^{82}+x^{79}+x^{78}\\
&+x^{71}+x^{70}+x^{68}+x^{67}+x^{54}+x^{52}+x^{50}+x^{47}+x^{43}+x^{41}+x^{40}\\
&+x^{39}+x^{38}+x^{37}+x^{36}+x^{34}+x^{33}+x^{30},\\
p_3(x)=&\,x^{117}+x^{114}+x^{113}+x^{112}+x^{111}+x^{109}+x^{108}+x^{107}+x^{104}+x^{102}\\
&+x^{101}+x^{100}+x^{99}+x^{97}+x^{96}+x^{95}+x^{92}+x^{90}+x^{88}+x^{86}+x^{85}\\
&+x^{84}+x^{83}+x^{81}+x^{80}+x^{79}+x^{76}+x^{74}+x^{72}+x^{70}+x^{69}+x^{68}\\
&+x^{67}+x^{65}+x^{64}+x^{63}+x^{60}+x^{58}+x^{56}+x^{54}+x^{52}+x^{51}+x^{50}\\
&+x^{43}+x^{41}+x^{40}+x^{39}+x^{37}+x^{36}+x^{35}+x^{32}+x^{30}+x^{28}+x^{27}\\
&+x^{26}+x^{21}+x^{19}+x^{18},\\
p_6(x)=&\,x^{120}+x^{119}+x^{118}+x^{117}+x^{116}+x^{114}+x^{113}+x^{112}+x^{111}+x^{110}\\
&+x^{106}+x^{105}+x^{102}+x^{100}+x^{98}+x^{95}+x^{93}+x^{89}+x^{87}+x^{83}\\
&+x^{82}+x^{80}+x^{79}+x^{76}+x^{74}+x^{72}+x^{69}+x^{67}+x^{64}+x^{62}+x^{59}\\
&+x^{57}+x^{54}+x^{51}+x^{50}+x^{38}+x^{37}+x^{34}+x^{31}+x^{30}+x^{28}+x^{27}\\
&+x^{24}+x^{21}+x^{19}+x^{16}+x^{13}+x^{12},\\
p_9(x)=&\,x^{123}+x^{121}+x^{120}+x^{111}+x^{109}+x^{108}+x^{105}+x^{103}+x^{102}+x^{101}\\
&+x^{99}+x^{98}+x^{95}+x^{92}+x^{90}+x^{89}+x^{88}+x^{85}+x^{82}+x^{81}+x^{80}\\
&+x^{75}+x^{73}+x^{72}+x^{71}+x^{69}+x^{68}+x^{65}+x^{63}+x^{62}+x^{61}+x^{58}\\
&+x^{56}+x^{54}+x^{53}+x^{52}+x^{45}+x^{43}+x^{42}+x^{33}+x^{30}+x^{28}+x^{27}\\
&+x^{26}+x^{19}+x^{16}+x^{14}+x^{13}+x^{12}+x^{9}+x^{7}+x^{6},\\
p_{12}(x)=&\,x^{126}+x^{125}+x^{122}+x^{120}+x^{117}+x^{116}+x^{106}+x^{105}+x^{102}+x^{100}\\
&+x^{97}+x^{96}+x^{78}+x^{77}+x^{74}+x^{72}+x^{69}+x^{68}+x^{62}+x^{61}+x^{57}\\
&+x^{56}+x^{54}+x^{53}+x^{49}+x^{48}+x^{46}+x^{45}+x^{41}+x^{40}+x^{38}+x^{37}\\
&+x^{33}+x^{32}+x^{30}+x^{29}+x^{25}+x^{24}+x^{22}+x^{21}+x^{17}+x^{16}+x^{10}\\
&+x^{9}+x^{6}+x^{4}+x+1,
\end{aligned}
$$

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

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

$$
p_0(x)=x^{126}+x^{125}+x^{123}+x^{120}+x^{119}+x^{116}+x^{113}+x^{112}+x^{111}+x^{110}
$$

$$
\begin{aligned}
&+ x^{109} + x^{107} + x^{106} + x^{105} + x^{104} + x^{103} + x^{100} + x^{99} + x^{97} + x^{96} \\
&+ x^{95} + x^{91} + x^{90} + x^{89} + x^{88} + x^{86} + x^{85} + x^{84} + x^{82} + x^{79} + x^{78} \\
&+ x^{71} + x^{70} + x^{68} + x^{67} + x^{54} + x^{52} + x^{50} + x^{47} + x^{43} + x^{41} + x^{40} \\
&+ x^{39} + x^{38} + x^{37} + x^{36} + x^{34} + x^{33} + x^{30}, \\
p_3(x) &= x^{117} + x^{114} + x^{113} + x^{112} + x^{111} + x^{109} + x^{108} + x^{107} + x^{104} + x^{102} \\
&+ x^{101} + x^{100} + x^{99} + x^{97} + x^{96} + x^{95} + x^{92} + x^{90} + x^{88} + x^{86} + x^{85} \\
&+ x^{84} + x^{83} + x^{81} + x^{80} + x^{79} + x^{76} + x^{74} + x^{72} + x^{70} + x^{69} + x^{68} \\
&+ x^{67} + x^{65} + x^{64} + x^{63} + x^{60} + x^{58} + x^{56} + x^{54} + x^{52} + x^{51} + x^{50} \\
&+ x^{43} + x^{41} + x^{40} + x^{39} + x^{37} + x^{36} + x^{35} + x^{32} + x^{30} + x^{28} + x^{27} \\
&+ x^{26} + x^{21} + x^{19} + x^{18}, \\
p_6(x) &= x^{120} + x^{119} + x^{118} + x^{117} + x^{116} + x^{114} + x^{113} + x^{112} + x^{111} + x^{110} \\
&+ x^{106} + x^{105} + x^{102} + x^{100} + x^{98} + x^{95} + x^{93} + x^{89} + x^{87} + x^{83} \\
&+ x^{82} + x^{80} + x^{79} + x^{76} + x^{74} + x^{72} + x^{69} + x^{67} + x^{64} + x^{62} + x^{59} \\
&+ x^{57} + x^{54} + x^{51} + x^{50} + x^{38} + x^{37} + x^{34} + x^{31} + x^{30} + x^{28} + x^{27} \\
&+ x^{24} + x^{21} + x^{19} + x^{16} + x^{13} + x^{12}, \\
p_9(x) &= x^{123} + x^{121} + x^{120} + x^{111} + x^{109} + x^{108} + x^{105} + x^{103} + x^{102} + x^{101} \\
&+ x^{99} + x^{98} + x^{95} + x^{92} + x^{90} + x^{89} + x^{88} + x^{85} + x^{82} + x^{81} + x^{80} \\
&+ x^{75} + x^{73} + x^{72} + x^{71} + x^{69} + x^{68} + x^{65} + x^{63} + x^{62} + x^{61} + x^{58} \\
&+ x^{56} + x^{54} + x^{53} + x^{52} + x^{45} + x^{43} + x^{42} + x^{33} + x^{30} + x^{28} + x^{27} \\
&+ x^{26} + x^{19} + x^{16} + x^{14} + x^{13} + x^{12} + x^{9} + x^{7} + x^{6}, \\
p_{12}(x) &= x^{126} + x^{125} + x^{122} + x^{120} + x^{117} + x^{116} + x^{106} + x^{105} + x^{102} + x^{100} \\
&+ x^{97} + x^{96} + x^{78} + x^{77} + x^{74} + x^{72} + x^{69} + x^{68} + x^{62} + x^{61} + x^{57} \\
&+ x^{56} + x^{54} + x^{53} + x^{49} + x^{48} + x^{46} + x^{45} + x^{41} + x^{40} + x^{38} + x^{37} \\
&+ x^{33} + x^{32} + x^{30} + x^{29} + x^{25} + x^{24} + x^{22} + x^{21} + x^{17} + x^{16} + x^{10} \\
&+ x^{9} + x^{6} + x^{4} + x + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{132} + x^{130} + x^{128} + x^{122} + x^{120} + x^{108} + x^{106} + x^{100} + x^{88} + x^{84} \\
&+ x^{82} + x^{80} + x^{78} + x^{74} + x^{68} + x^{62} + x^{60} + x^{58} + x^{52} + x^{48} + x^{44} \\
&+ x^{42} + x^{40} + x^{38} + x^{36}, \\
p_3(x) &= x^{130} + x^{122} + x^{120} + x^{118} + x^{116} + x^{114} + x^{100} + x^{92} + x^{88} + x^{82} \\
&+ x^{74} + x^{66} + x^{60} + x^{58} + x^{54} + x^{46} + x^{44} + x^{34} + x^{30} + x^{28} + x^{24} \\
&+ x^{20} + x^{16} + x^{12}, \\
p_6(x) &= x^{130} + x^{118} + x^{114} + x^{112} + x^{110} + x^{106} + x^{100} + x^{90} + x^{86} + x^{84} \\
&+ x^{80} + x^{78} + x^{68} + x^{64} + x^{62} + x^{60} + x^{58} + x^{54} + x^{52} + x^{48} + x^{40}
\end{aligned}
$$

$$
\begin{aligned}
&+ x^{38} + x^{36} + x^{32} + x^{22} + x^{20} + x^{16} + x^{12} + x^{10} + 1,\\
p_9(x) &= x^{130} + x^{122} + x^{118} + x^{114} + x^{112} + x^{108} + x^{106} + x^{104} + x^{102} + x^{98}\\
&+ x^{96} + x^{94} + x^{86} + x^{80} + x^{78} + x^{72} + x^{68} + x^{66} + x^{60} + x^{52} + x^{48}\\
&+ x^{46} + x^{42} + x^{36} + x^{34} + x^{32} + x^{28} + x^{22} + x^{18} + x^{14} + x^{10} + x^{4},\\
p_{12}(x) &= x^{132} + x^{128} + x^{124} + x^{120} + x^{116} + x^{112} + x^{108} + x^{104} + x^{100} + x^{96}\\
&+ x^{84} + x^{80} + x^{76} + x^{72} + x^{52} + x^{48} + x^{36} + x^{32} + x^{12} + x^{8} + x^{4} + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{126} + x^{125} + x^{124} + x^{123} + x^{122} + x^{121} + x^{119} + x^{117} + x^{116} + x^{113}\\
&+ x^{111} + x^{110} + x^{109} + x^{107} + x^{105} + x^{104} + x^{103} + x^{102} + x^{99} + x^{97}\\
&+ x^{96} + x^{94} + x^{89} + x^{88} + x^{84} + x^{83} + x^{78} + x^{77} + x^{73} + x^{72} + x^{68}\\
&+ x^{64} + x^{62} + x^{60} + x^{58} + x^{57} + x^{56} + x^{55} + x^{52} + x^{47} + x^{46} + x^{42}\\
&+ x^{41} + x^{40} + x^{38} + x^{37} + x^{36} + x^{32} + x^{31} + x^{30} + x^{28} + x^{25} + x^{24},\\
p_3(x) &= x^{122} + x^{121} + x^{120} + x^{119} + x^{118} + x^{117} + x^{115} + x^{114} + x^{111} + x^{110}\\
&+ x^{109} + x^{108} + x^{107} + x^{105} + x^{104} + x^{103} + x^{102} + x^{101} + x^{100}\\
&+ x^{99} + x^{94} + x^{93} + x^{89} + x^{87} + x^{86} + x^{84} + x^{82} + x^{81} + x^{79} + x^{78}\\
&+ x^{77} + x^{75} + x^{74} + x^{73} + x^{71} + x^{69} + x^{68} + x^{65} + x^{62} + x^{59} + x^{57}\\
&+ x^{56} + x^{55} + x^{53} + x^{52} + x^{48} + x^{47} + x^{44} + x^{43} + x^{42} + x^{40} + x^{36}\\
&+ x^{34} + x^{31} + x^{30} + x^{28} + x^{25} + x^{23} + x^{22} + x^{20} + x^{17} + x^{16},\\
p_6(x) &= x^{124} + x^{123} + x^{121} + x^{120} + x^{119} + x^{112} + x^{110} + x^{109} + x^{108} + x^{106}\\
&+ x^{105} + x^{100} + x^{98} + x^{92} + x^{91} + x^{90} + x^{88} + x^{87} + x^{85} + x^{80} + x^{79}\\
&+ x^{78} + x^{77} + x^{75} + x^{73} + x^{71} + x^{70} + x^{69} + x^{68} + x^{67} + x^{61} + x^{60}\\
&+ x^{58} + x^{56} + x^{55} + x^{52} + x^{51} + x^{50} + x^{49} + x^{48} + x^{46} + x^{42} + x^{38}\\
&+ x^{34} + x^{32} + x^{30} + x^{28} + x^{27} + x^{25} + x^{24} + x^{22} + x^{20} + x^{17} + x^{15}\\
&+ x^{14} + x^{12} + x^{10} + x^{8} + x^{6} + x^{4} + x + 1,\\
p_9(x) &= x^{122} + x^{121} + x^{117} + x^{116} + x^{114} + x^{113} + x^{110} + x^{108} + x^{105} + x^{104}\\
&+ x^{74} + x^{73} + x^{69} + x^{68} + x^{66} + x^{65} + x^{62} + x^{60} + x^{58} + x^{56} + x^{53}\\
&+ x^{52} + x^{50} + x^{49} + x^{46} + x^{44} + x^{42} + x^{40} + x^{37} + x^{36} + x^{34} + x^{33}\\
&+ x^{30} + x^{28} + x^{26} + x^{24} + x^{21} + x^{20} + x^{18} + x^{17} + x^{14} + x^{12} + x^{9}\\
&+ x^{8},\\
p_{12}(x) &= x^{126} + x^{125} + x^{121} + x^{120} + x^{114} + x^{113} + x^{110} + x^{108} + x^{106} + x^{104}\\
&+ x^{102} + x^{100} + x^{97} + x^{96} + x^{78} + x^{77} + x^{73} + x^{72} + x^{66} + x^{65} + x^{61}\\
&+ x^{60} + x^{58} + x^{57} + x^{54} + x^{52} + x^{50} + x^{48} + x^{45} + x^{44} + x^{42} + x^{41}\\
&+ x^{38} + x^{36} + x^{34} + x^{32} + x^{29} + x^{28} + x^{26} + x^{25} + x^{22} + x^{20} + x^{18}\\
&+ x^{16} + x^{14} + x^{12} + x^{10} + x^{8} + x^{6} + x^{4} + x + 1,
\end{aligned}
$$

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

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

$$\begin{aligned}
p_0(x) &= x^{128} + x^{125} + x^{123} + x^{121} + x^{120} + x^{118} + x^{116} + x^{113} + x^{106} + x^{104} \\
&\quad + x^{103} + x^{96} + x^{95} + x^{94} + x^{92} + x^{90} + x^{88} + x^{85} + x^{82} + x^{80} + x^{79} \\
&\quad + x^{78} + x^{76} + x^{74} + x^{72} + x^{70} + x^{67} + x^{66} + x^{65} + x^{64} + x^{61} + x^{60} \\
&\quad + x^{59} + x^{58} + x^{55} + x^{53} + x^{51} + x^{50} + x^{49} + x^{45} + x^{44} + x^{39} + x^{37} \\
&\quad + x^{31} + x^{30}, \\
p_3(x) &= x^{119} + x^{118} + x^{116} + x^{114} + x^{110} + x^{109} + x^{108} + x^{104} + x^{102} + x^{100} \\
&\quad + x^{98} + x^{96} + x^{94} + x^{92} + x^{90} + x^{88} + x^{86} + x^{84} + x^{82} + x^{80} + x^{78} \\
&\quad + x^{76} + x^{74} + x^{72} + x^{70} + x^{68} + x^{66} + x^{64} + x^{62} + x^{60} + x^{58} + x^{56} \\
&\quad + x^{55} + x^{48} + x^{47} + x^{46} + x^{45} + x^{44} + x^{38} + x^{37} + x^{36} + x^{32} + x^{31} \\
&\quad + x^{24} + x^{21} + x^{18}, \\
p_6(x) &= x^{122} + x^{120} + x^{118} + x^{114} + x^{112} + x^{110} + x^{108} + x^{104} + x^{98} + x^{96} \\
&\quad + x^{94} + x^{90} + x^{88} + x^{78} + x^{72} + x^{70} + x^{68} + x^{66} + x^{62} + x^{60} + x^{58} \\
&\quad + x^{56} + x^{54} + x^{50} + x^{40} + x^{36} + x^{34} + x^{26} + x^{24} + x^{22} + x^{20} + x^{18} \\
&\quad + x^{16} + x^{12}, \\
p_9(x) &= x^{125} + x^{124} + x^{123} + x^{119} + x^{117} + x^{116} + x^{115} + x^{113} + x^{111} + x^{110} \\
&\quad + x^{105} + x^{102} + x^{77} + x^{76} + x^{75} + x^{71} + x^{69} + x^{68} + x^{67} + x^{65} + x^{63} \\
&\quad + x^{62} + x^{61} + x^{60} + x^{59} + x^{57} + x^{55} + x^{54} + x^{53} + x^{52} + x^{51} + x^{49} \\
&\quad + x^{47} + x^{46} + x^{45} + x^{44} + x^{43} + x^{41} + x^{39} + x^{38} + x^{37} + x^{36} + x^{35} \\
&\quad + x^{33} + x^{31} + x^{30} + x^{29} + x^{28} + x^{27} + x^{25} + x^{23} + x^{22} + x^{21} + x^{20} \\
&\quad + x^{19} + x^{17} + x^{15} + x^{14} + x^{9} + x^{6}, \\
p_{12}(x) &= x^{128} + x^{120} + x^{116} + x^{112} + x^{100} + x^{96} + x^{80} + x^{72} + x^{68} + x^{56} + x^{48} \\
&\quad + x^{40} + x^{32} + x^{24} + x^{4} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{136} + x^{133} + x^{132} + x^{131} + x^{130} + x^{128} + x^{127} + x^{125} + x^{122} + x^{120} \\
&\quad + x^{119} + x^{116} + x^{115} + x^{114} + x^{113} + x^{112} + x^{110} + x^{108} + x^{106} \\
&\quad + x^{105} + x^{103} + x^{102} + x^{99} + x^{98} + x^{95} + x^{92} + x^{89} + x^{86} + x^{85} + x^{84} \\
&\quad + x^{83} + x^{78} + x^{77} + x^{75} + x^{74} + x^{69} + x^{68} + x^{67} + x^{66} + x^{61} + x^{58} \\
&\quad + x^{54} + x^{48} + x^{47} + x^{46} + x^{41} + x^{34} + x^{32} + x^{31} + x^{30}, \\
p_3(x) &= x^{127} + x^{126} + x^{124} + x^{123} + x^{120} + x^{117} + x^{116} + x^{114} + x^{113} + x^{111} \\
&\quad + x^{108} + x^{106} + x^{103} + x^{101} + x^{98} + x^{96} + x^{95} + x^{94} + x^{93} + x^{92} \\
&\quad + x^{87} + x^{85} + x^{82} + x^{80} + x^{79} + x^{78} + x^{77} + x^{76} + x^{71} + x^{69} + x^{66} \\
&\quad + x^{64} + x^{61} + x^{59} + x^{56} + x^{54} + x^{51} + x^{49} + x^{46} + x^{44} + x^{41} + x^{38}
\end{aligned}$$

$$
\begin{aligned}
&+x^{35}+x^{34}+x^{32}+x^{31}+x^{28}+x^{25}+x^{24}+x^{22}+x^{21}+x^{18},\\
p_6(x) &= x^{130}+x^{128}+x^{124}+x^{120}+x^{112}+x^{110}+x^{108}+x^{106}+x^{104}+x^{94}\\
&+x^{90}+x^{84}+x^{82}+x^{76}+x^{62}+x^{60}+x^{58}+x^{54}+x^{52}+x^{46}+x^{44}\\
&+x^{36}+x^{32}+x^{30}+x^{18}+x^{12},\\
p_9(x) &= x^{133}+x^{132}+x^{131}+x^{129}+x^{128}+x^{125}+x^{124}+x^{120}+x^{118}+x^{116}\\
&+x^{114}+x^{113}+x^{111}+x^{110}+x^{109}+x^{106}+x^{105}+x^{102}+x^{85}+x^{84}\\
&+x^{83}+x^{81}+x^{80}+x^{77}+x^{76}+x^{72}+x^{70}+x^{69}+x^{67}+x^{66}+x^{64}\\
&+x^{63}+x^{62}+x^{60}+x^{58}+x^{57}+x^{56}+x^{53}+x^{51}+x^{50}+x^{48}+x^{47}\\
&+x^{46}+x^{44}+x^{42}+x^{41}+x^{40}+x^{37}+x^{35}+x^{34}+x^{32}+x^{31}+x^{30}\\
&+x^{28}+x^{26}+x^{25}+x^{24}+x^{20}+x^{18}+x^{17}+x^{15}+x^{14}+x^{13}+x^{10}\\
&+x^{9}+x^{6},\\
p_{12}(x) &= x^{136}+x^{132}+x^{128}+x^{120}+x^{116}+x^{104}+x^{96}+x^{88}+x^{84}+x^{80}\\
&+x^{64}+x^{56}+x^{40}+x^{20}+x^{16}+x^{8}+1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{126}+x^{125}+x^{124}+x^{123}+x^{120}+x^{118}+x^{117}+x^{115}+x^{114}+x^{113}\\
&+x^{112}+x^{110}+x^{108}+x^{107}+x^{106}+x^{103}+x^{99}+x^{96}+x^{95}+x^{93}\\
&+x^{92}+x^{90}+x^{87}+x^{86}+x^{85}+x^{84}+x^{83}+x^{81}+x^{79}+x^{78}+x^{76}\\
&+x^{75}+x^{74}+x^{70}+x^{67}+x^{66}+x^{65}+x^{63}+x^{59}+x^{55}+x^{54}+x^{47}\\
&+x^{46}+x^{45}+x^{44}+x^{41}+x^{39}+x^{37}+x^{36},\\
p_3(x) &= x^{122}+x^{121}+x^{120}+x^{119}+x^{116}+x^{114}+x^{113}+x^{111}+x^{109}+x^{107}\\
&+x^{103}+x^{100}+x^{99}+x^{98}+x^{96}+x^{94}+x^{92}+x^{89}+x^{87}+x^{85}+x^{84}\\
&+x^{81}+x^{80}+x^{79}+x^{78}+x^{76}+x^{75}+x^{74}+x^{73}+x^{71}+x^{70}+x^{68}\\
&+x^{66}+x^{65}+x^{64}+x^{62}+x^{61}+x^{60}+x^{59}+x^{57}+x^{56}+x^{55}+x^{53}\\
&+x^{51}+x^{50}+x^{49}+x^{47}+x^{42}+x^{38}+x^{34}+x^{33}+x^{32}+x^{31}+x^{30}\\
&+x^{27}+x^{26}+x^{24}+x^{23}+x^{21}+x^{20},\\
p_6(x) &= x^{124}+x^{123}+x^{122}+x^{117}+x^{113}+x^{112}+x^{111}+x^{110}+x^{109}+x^{106}\\
&+x^{104}+x^{102}+x^{101}+x^{100}+x^{98}+x^{97}+x^{95}+x^{94}+x^{93}+x^{91}\\
&+x^{89}+x^{84}+x^{83}+x^{81}+x^{77}+x^{75}+x^{74}+x^{71}+x^{70}+x^{68}+x^{64}\\
&+x^{62}+x^{61}+x^{60}+x^{59}+x^{58}+x^{57}+x^{56}+x^{55}+x^{53}+x^{52}+x^{45}\\
&+x^{40}+x^{36}+x^{32}+x^{31}+x^{25}+x^{20}+x^{19}+x^{18}+x^{17}+x^{15}+x^{13}\\
&+x^{12}+x^{10}+x^{9}+x^{6}+x^{4}+x+1,\\
p_9(x) &= x^{122}+x^{121}+x^{117}+x^{116}+x^{114}+x^{113}+x^{110}+x^{108}+x^{105}+x^{104}\\
&+x^{74}+x^{73}+x^{69}+x^{68}+x^{66}+x^{65}+x^{62}+x^{60}+x^{58}+x^{56}+x^{53}\\
&+x^{52}+x^{50}+x^{49}+x^{46}+x^{44}+x^{42}+x^{40}+x^{37}+x^{36}+x^{34}+x^{33}
\end{aligned}
$$

$$
\begin{aligned}
&+ x^{30} + x^{28} + x^{26} + x^{24} + x^{21} + x^{20} + x^{18} + x^{17} + x^{14} + x^{12} + x^{9}\\
&+ x^{8},\\
p_{12}(x) = {} & x^{126} + x^{125} + x^{121} + x^{120} + x^{114} + x^{113} + x^{110} + x^{108} + x^{106} + x^{104}\\
&+ x^{102} + x^{100} + x^{97} + x^{96} + x^{78} + x^{77} + x^{73} + x^{72} + x^{66} + x^{65} + x^{61}\\
&+ x^{60} + x^{58} + x^{57} + x^{54} + x^{52} + x^{50} + x^{48} + x^{45} + x^{44} + x^{42} + x^{41}\\
&+ x^{38} + x^{36} + x^{34} + x^{32} + x^{29} + x^{28} + x^{26} + x^{25} + x^{22} + x^{20} + x^{18}\\
&+ x^{16} + x^{14} + x^{12} + x^{10} + x^{8} + x^{6} + x^{4} + x + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_{0}(x) = {} & x^{126} + x^{125} + x^{124} + x^{123} + x^{122} + x^{121} + x^{119} + x^{117} + x^{116} + x^{113}\\
&+ x^{111} + x^{110} + x^{109} + x^{107} + x^{105} + x^{104} + x^{103} + x^{102} + x^{99} + x^{97}\\
&+ x^{96} + x^{94} + x^{89} + x^{88} + x^{84} + x^{83} + x^{78} + x^{77} + x^{73} + x^{72} + x^{68}\\
&+ x^{64} + x^{62} + x^{60} + x^{58} + x^{57} + x^{56} + x^{55} + x^{52} + x^{47} + x^{46} + x^{42}\\
&+ x^{41} + x^{40} + x^{38} + x^{37} + x^{36} + x^{32} + x^{31} + x^{30} + x^{28} + x^{25} + x^{24},\\
p_{3}(x) = {} & x^{122} + x^{121} + x^{120} + x^{119} + x^{118} + x^{117} + x^{115} + x^{114} + x^{111} + x^{110}\\
&+ x^{109} + x^{108} + x^{107} + x^{105} + x^{104} + x^{103} + x^{102} + x^{101} + x^{100}\\
&+ x^{99} + x^{94} + x^{93} + x^{89} + x^{87} + x^{86} + x^{84} + x^{82} + x^{81} + x^{79} + x^{78}\\
&+ x^{77} + x^{75} + x^{74} + x^{73} + x^{71} + x^{69} + x^{68} + x^{65} + x^{62} + x^{59} + x^{57}\\
&+ x^{56} + x^{55} + x^{53} + x^{52} + x^{48} + x^{47} + x^{44} + x^{43} + x^{42} + x^{40} + x^{36}\\
&+ x^{34} + x^{31} + x^{30} + x^{28} + x^{25} + x^{23} + x^{22} + x^{20} + x^{17} + x^{16},\\
p_{6}(x) = {} & x^{124} + x^{123} + x^{121} + x^{120} + x^{119} + x^{112} + x^{110} + x^{109} + x^{108} + x^{106}\\
&+ x^{105} + x^{100} + x^{98} + x^{92} + x^{91} + x^{90} + x^{88} + x^{87} + x^{85} + x^{80} + x^{79}\\
&+ x^{78} + x^{77} + x^{75} + x^{73} + x^{71} + x^{70} + x^{69} + x^{68} + x^{67} + x^{61} + x^{60}\\
&+ x^{58} + x^{56} + x^{55} + x^{52} + x^{51} + x^{50} + x^{49} + x^{48} + x^{46} + x^{42} + x^{38}\\
&+ x^{34} + x^{32} + x^{30} + x^{28} + x^{27} + x^{25} + x^{24} + x^{22} + x^{20} + x^{17} + x^{15}\\
&+ x^{14} + x^{12} + x^{10} + x^{8} + x^{6} + x^{4} + x + 1,\\
p_{9}(x) = {} & x^{122} + x^{121} + x^{117} + x^{116} + x^{114} + x^{113} + x^{110} + x^{108} + x^{105} + x^{104}\\
&+ x^{74} + x^{73} + x^{69} + x^{68} + x^{66} + x^{65} + x^{62} + x^{60} + x^{58} + x^{56} + x^{53}\\
&+ x^{52} + x^{50} + x^{49} + x^{46} + x^{44} + x^{42} + x^{40} + x^{37} + x^{36} + x^{34} + x^{33}\\
&+ x^{30} + x^{28} + x^{26} + x^{24} + x^{21} + x^{20} + x^{18} + x^{17} + x^{14} + x^{12} + x^{9}\\
&+ x^{8},\\
p_{12}(x) = {} & x^{126} + x^{125} + x^{121} + x^{120} + x^{114} + x^{113} + x^{110} + x^{108} + x^{106} + x^{104}\\
&+ x^{102} + x^{100} + x^{97} + x^{96} + x^{78} + x^{77} + x^{73} + x^{72} + x^{66} + x^{65} + x^{61}\\
&+ x^{60} + x^{58} + x^{57} + x^{54} + x^{52} + x^{50} + x^{48} + x^{45} + x^{44} + x^{42} + x^{41}\\
&+ x^{38} + x^{36} + x^{34} + x^{32} + x^{29} + x^{28} + x^{26} + x^{25} + x^{22} + x^{20} + x^{18}
\end{aligned}
$$

$$+ x^{16} + x^{14} + x^{12} + x^{10} + x^{8} + x^{6} + x^{4} + x + 1,$$

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

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

$$\begin{aligned}
p_0(x) &= x^{136} + x^{133} + x^{132} + x^{131} + x^{130} + x^{128} + x^{127} + x^{125} + x^{122} + x^{120} \\
&\quad + x^{119} + x^{116} + x^{115} + x^{114} + x^{113} + x^{112} + x^{110} + x^{108} + x^{106} \\
&\quad + x^{105} + x^{103} + x^{102} + x^{99} + x^{98} + x^{95} + x^{92} + x^{89} + x^{86} + x^{85} + x^{84} \\
&\quad + x^{83} + x^{78} + x^{77} + x^{75} + x^{74} + x^{69} + x^{68} + x^{67} + x^{66} + x^{61} + x^{58} \\
&\quad + x^{54} + x^{48} + x^{47} + x^{46} + x^{41} + x^{34} + x^{32} + x^{31} + x^{30}, \\
p_3(x) &= x^{127} + x^{126} + x^{124} + x^{123} + x^{120} + x^{117} + x^{116} + x^{114} + x^{113} + x^{111} \\
&\quad + x^{108} + x^{106} + x^{103} + x^{101} + x^{98} + x^{96} + x^{95} + x^{94} + x^{93} + x^{92} \\
&\quad + x^{87} + x^{85} + x^{82} + x^{80} + x^{79} + x^{78} + x^{77} + x^{76} + x^{71} + x^{69} + x^{66} \\
&\quad + x^{64} + x^{61} + x^{59} + x^{56} + x^{54} + x^{51} + x^{49} + x^{46} + x^{44} + x^{41} + x^{38} \\
&\quad + x^{35} + x^{34} + x^{32} + x^{31} + x^{28} + x^{25} + x^{24} + x^{22} + x^{21} + x^{18}, \\
p_6(x) &= x^{130} + x^{128} + x^{124} + x^{120} + x^{112} + x^{110} + x^{108} + x^{106} + x^{104} + x^{94} \\
&\quad + x^{90} + x^{84} + x^{82} + x^{76} + x^{62} + x^{60} + x^{58} + x^{54} + x^{52} + x^{46} + x^{44} \\
&\quad + x^{36} + x^{32} + x^{30} + x^{18} + x^{12}, \\
p_9(x) &= x^{133} + x^{132} + x^{131} + x^{129} + x^{128} + x^{125} + x^{124} + x^{120} + x^{118} + x^{116} \\
&\quad + x^{114} + x^{113} + x^{111} + x^{110} + x^{109} + x^{106} + x^{105} + x^{102} + x^{85} + x^{84} \\
&\quad + x^{83} + x^{81} + x^{80} + x^{77} + x^{76} + x^{72} + x^{70} + x^{69} + x^{67} + x^{66} + x^{64} \\
&\quad + x^{63} + x^{62} + x^{60} + x^{58} + x^{57} + x^{56} + x^{53} + x^{51} + x^{50} + x^{48} + x^{47} \\
&\quad + x^{46} + x^{44} + x^{42} + x^{41} + x^{40} + x^{37} + x^{35} + x^{34} + x^{32} + x^{31} + x^{30} \\
&\quad + x^{28} + x^{26} + x^{25} + x^{24} + x^{20} + x^{18} + x^{17} + x^{15} + x^{14} + x^{13} + x^{10} \\
&\quad + x^{9} + x^{6}, \\
p_{12}(x) &= x^{136} + x^{132} + x^{128} + x^{120} + x^{116} + x^{104} + x^{96} + x^{88} + x^{84} + x^{80} \\
&\quad + x^{64} + x^{56} + x^{40} + x^{20} + x^{16} + x^{8} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{128} + x^{125} + x^{123} + x^{121} + x^{120} + x^{118} + x^{116} + x^{113} + x^{106} + x^{104} \\
&\quad + x^{103} + x^{96} + x^{95} + x^{94} + x^{92} + x^{90} + x^{88} + x^{85} + x^{82} + x^{80} + x^{79} \\
&\quad + x^{78} + x^{76} + x^{74} + x^{72} + x^{70} + x^{67} + x^{66} + x^{65} + x^{64} + x^{61} + x^{60} \\
&\quad + x^{59} + x^{58} + x^{55} + x^{53} + x^{51} + x^{50} + x^{49} + x^{45} + x^{44} + x^{39} + x^{37} \\
&\quad + x^{31} + x^{30}, \\
p_3(x) &= x^{119} + x^{118} + x^{116} + x^{114} + x^{110} + x^{109} + x^{108} + x^{104} + x^{102} + x^{100} \\
&\quad + x^{98} + x^{96} + x^{94} + x^{92} + x^{90} + x^{88} + x^{86} + x^{84} + x^{82} + x^{80} + x^{78} \\
&\quad + x^{76} + x^{74} + x^{72} + x^{70} + x^{68} + x^{66} + x^{64} + x^{62} + x^{60} + x^{58} + x^{56}
\end{aligned}$$

$$
\begin{aligned}
&+ x^{55} + x^{48} + x^{47} + x^{46} + x^{45} + x^{44} + x^{38} + x^{37} + x^{36} + x^{32} + x^{31}\\
&+ x^{24} + x^{21} + x^{18},\\
p_6(x) &= x^{122} + x^{120} + x^{118} + x^{114} + x^{112} + x^{110} + x^{108} + x^{104} + x^{98} + x^{96}\\
&+ x^{94} + x^{90} + x^{88} + x^{78} + x^{72} + x^{70} + x^{68} + x^{66} + x^{62} + x^{60} + x^{58}\\
&+ x^{56} + x^{54} + x^{50} + x^{40} + x^{36} + x^{34} + x^{26} + x^{24} + x^{22} + x^{20} + x^{18}\\
&+ x^{16} + x^{12},\\
p_9(x) &= x^{125} + x^{124} + x^{123} + x^{119} + x^{117} + x^{116} + x^{115} + x^{113} + x^{111} + x^{110}\\
&+ x^{105} + x^{102} + x^{77} + x^{76} + x^{75} + x^{71} + x^{69} + x^{68} + x^{67} + x^{65} + x^{63}\\
&+ x^{62} + x^{61} + x^{60} + x^{59} + x^{57} + x^{55} + x^{54} + x^{53} + x^{52} + x^{51} + x^{49}\\
&+ x^{47} + x^{46} + x^{45} + x^{44} + x^{43} + x^{41} + x^{39} + x^{38} + x^{37} + x^{36} + x^{35}\\
&+ x^{33} + x^{31} + x^{30} + x^{29} + x^{28} + x^{27} + x^{25} + x^{23} + x^{22} + x^{21} + x^{20}\\
&+ x^{19} + x^{17} + x^{15} + x^{14} + x^{9} + x^{6},\\
p_{12}(x) &= x^{128} + x^{120} + x^{116} + x^{112} + x^{100} + x^{96} + x^{80} + x^{72} + x^{68} + x^{56} + x^{48}\\
&+ x^{40} + x^{32} + x^{24} + x^{4} + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{126} + x^{125} + x^{124} + x^{123} + x^{120} + x^{118} + x^{117} + x^{115} + x^{114} + x^{113}\\
&+ x^{112} + x^{110} + x^{108} + x^{107} + x^{106} + x^{103} + x^{99} + x^{96} + x^{95} + x^{93}\\
&+ x^{92} + x^{90} + x^{87} + x^{86} + x^{85} + x^{84} + x^{83} + x^{81} + x^{79} + x^{78} + x^{76}\\
&+ x^{75} + x^{74} + x^{70} + x^{67} + x^{66} + x^{65} + x^{63} + x^{59} + x^{55} + x^{54} + x^{47}\\
&+ x^{46} + x^{45} + x^{44} + x^{41} + x^{39} + x^{37} + x^{36},\\
p_3(x) &= x^{122} + x^{121} + x^{120} + x^{119} + x^{116} + x^{114} + x^{113} + x^{111} + x^{109} + x^{107}\\
&+ x^{103} + x^{100} + x^{99} + x^{98} + x^{96} + x^{94} + x^{92} + x^{89} + x^{87} + x^{85} + x^{84}\\
&+ x^{81} + x^{80} + x^{79} + x^{78} + x^{76} + x^{75} + x^{74} + x^{73} + x^{71} + x^{70} + x^{68}\\
&+ x^{66} + x^{65} + x^{64} + x^{62} + x^{61} + x^{60} + x^{59} + x^{57} + x^{56} + x^{55} + x^{53}\\
&+ x^{51} + x^{50} + x^{49} + x^{47} + x^{42} + x^{38} + x^{34} + x^{33} + x^{32} + x^{31} + x^{30}\\
&+ x^{27} + x^{26} + x^{24} + x^{23} + x^{21} + x^{20},\\
p_6(x) &= x^{124} + x^{123} + x^{122} + x^{117} + x^{113} + x^{112} + x^{111} + x^{110} + x^{109} + x^{106}\\
&+ x^{104} + x^{102} + x^{101} + x^{100} + x^{98} + x^{97} + x^{95} + x^{94} + x^{93} + x^{91}\\
&+ x^{89} + x^{84} + x^{83} + x^{81} + x^{77} + x^{75} + x^{74} + x^{71} + x^{70} + x^{68} + x^{64}\\
&+ x^{62} + x^{61} + x^{60} + x^{59} + x^{58} + x^{57} + x^{56} + x^{55} + x^{53} + x^{52} + x^{45}\\
&+ x^{40} + x^{36} + x^{32} + x^{31} + x^{25} + x^{20} + x^{19} + x^{18} + x^{17} + x^{15} + x^{13}\\
&+ x^{12} + x^{10} + x^{9} + x^{6} + x^{4} + x + 1,\\
p_9(x) &= x^{122} + x^{121} + x^{117} + x^{116} + x^{114} + x^{113} + x^{110} + x^{108} + x^{105} + x^{104}\\
&+ x^{74} + x^{73} + x^{69} + x^{68} + x^{66} + x^{65} + x^{62} + x^{60} + x^{58} + x^{56} + x^{53}
\end{aligned}
$$

$$+ x^{52} + x^{50} + x^{49} + x^{46} + x^{44} + x^{42} + x^{40} + x^{37} + x^{36} + x^{34} + x^{33} + x^{30} + x^{28} + x^{26} + x^{24} + x^{21} + x^{20} + x^{18} + x^{17} + x^{14} + x^{12} + x^{9} + x^{8},$$

$$p_{12}(x) = x^{126} + x^{125} + x^{121} + x^{120} + x^{114} + x^{113} + x^{110} + x^{108} + x^{106} + x^{104} + x^{102} + x^{100} + x^{97} + x^{96} + x^{78} + x^{77} + x^{73} + x^{72} + x^{66} + x^{65} + x^{61} + x^{60} + x^{58} + x^{57} + x^{54} + x^{52} + x^{50} + x^{48} + x^{45} + x^{44} + x^{42} + x^{41} + x^{38} + x^{36} + x^{34} + x^{32} + x^{29} + x^{28} + x^{26} + x^{25} + x^{22} + x^{20} + x^{18} + x^{16} + x^{14} + x^{12} + x^{10} + x^{8} + x^{6} + x^{4} + x + 1,$$

and the initial terms are [0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 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]	771	[1269, 280]	1542	[29, 922]	2313	[2647, 1500]
1	[3, 4]	772	[842, 1270]	1543	[2111, 247]	2314	[2648, 2402]
2	[5, 6]	773	[372, 1271]	1544	[1930, 2097]	2315	[1395, 1398]
3	[7, 8]	774	[124, 1083]	1545	[1011, 2112]	2316	[1321, 1372]
4	[9, 10]	775	[107, 1135]	1546	[2113, 121]	2317	[583, 1488]
5	[11, 12]	776	[1272, 1273]	1547	[1013, 2114]	2318	[1494, 2649]
6	[13, 14]	777	[1274, 1275]	1548	[1918, 2115]	2319	[2650, 1837]
7	[15, 16]	778	[93, 441]	1549	[277, 2116]	2320	[456, 2651]
8	[17, 18]	779	[1276, 348]	1550	[2117, 2017]	2321	[209, 2652]
9	[19, 20]	780	[1277, 1278]	1551	[2118, 2004]	2322	[698, 2653]
10	[21, 22]	781	[423, 851]	1552	[1220, 2119]	2323	[1835, 2654]
11	[23, 24]	782	[255, 1279]	1553	[2120, 2121]	2324	[2655, 1808]
12	[25, 26]	783	[1280, 85]	1554	[1968, 2122]	2325	[481, 2656]
13	[27, 28]	784	[246, 1281]	1555	[848, 2123]	2326	[716, 2657]
14	[29, 30]	785	[1282, 1016]	1556	[840, 2124]	2327	[1532, 2652]
15	[31, 32]	786	[389, 1283]	1557	[2125, 2126]	2328	[2658, 2659]
16	[33, 34]	787	[1284, 1285]	1558	[2127, 2128]	2329	[1717, 1708]
17	[35, 36]	788	[945, 1286]	1559	[245, 2129]	2330	[2660, 799]
18	[37, 38]	789	[1287, 1288]	1560	[896, 1918]	2331	[2661, 716]
19	[39, 40]	790	[1289, 1290]	1561	[2130, 2131]	2332	[2439, 2371]
20	[41, 42]	791	[825, 1291]	1562	[2132, 854]	2333	[2447, 476]
21	[43, 44]	792	[1292, 1293]	1563	[2133, 2114]	2334	[2609, 2662]
22	[45, 46]	793	[1294, 1295]	1564	[2134, 67]	2335	[2420, 2663]
23	[47, 48]	794	[1296, 1297]	1565	[25, 2135]	2336	[1314, 1679]
24	[49, 50]	795	[1298, 1299]	1566	[1231, 2136]	2337	[1707, 2648]
25	[51, 52]	796	[1300, 366]	1567	[2137, 2033]	2338	[2664, 1593]
26	[53, 54]	797	[1301, 386]	1568	[873, 2138]	2339	[539, 2665]
27	[55, 56]	798	[1302, 1303]	1569	[821, 909]	2340	[2666, 589]
28	[57, 58]	799	[281, 1304]	1570	[1912, 2139]	2341	[2667, 1338]

29	[59, 60]	800	[94, 86]	1571	[2140, 2141]	2342	[2668, 2669]
30	[61, 62]	801	[816, 413]	1572	[2142, 1236]	2343	[1691, 2414]
31	[63, 64]	802	[1305, 1306]	1573	[1889, 2143]	2344	[489, 1607]
32	[65, 66]	803	[1307, 1308]	1574	[103, 1979]	2345	[2670, 544]
33	[67, 68]	804	[1309, 1310]	1575	[2144, 2145]	2346	[2671, 2487]
34	[69, 70]	805	[1311, 1312]	1576	[1304, 115]	2347	[51, 2672]
35	[71, 72]	806	[1313, 1314]	1577	[928, 421]	2348	[56, 2673]
36	[73, 74]	807	[508, 1315]	1578	[857, 449]	2349	[1660, 1865]
37	[75, 76]	808	[1316, 1317]	1579	[1021, 318]	2350	[705, 2455]
38	[77, 78]	809	[1318, 1319]	1580	[2146, 1889]	2351	[1467, 1370]
39	[79, 80]	810	[1320, 1321]	1581	[427, 2147]	2352	[1877, 2674]
40	[81, 82]	811	[1322, 1323]	1582	[2148, 1135]	2353	[193, 1636]
41	[16, 83]	812	[707, 1324]	1583	[66, 885]	2354	[2675, 54]
42	[84, 85]	813	[1325, 1326]	1584	[2149, 1295]	2355	[665, 2676]
43	[86, 87]	814	[629, 1327]	1585	[2150, 2024]	2356	[219, 2677]
44	[88, 89]	815	[1328, 1329]	1586	[886, 2151]	2357	[2678, 730]
45	[90, 91]	816	[1330, 1331]	1587	[279, 2152]	2358	[2521, 2679]
46	[92, 93]	817	[558, 661]	1588	[2153, 2154]	2359	[2680, 1383]
47	[94, 95]	818	[1332, 1333]	1589	[1249, 2155]	2360	[57, 651]
48	[96, 97]	819	[1334, 1335]	1590	[2156, 2157]	2361	[1648, 751]
49	[98, 99]	820	[1336, 214]	1591	[424, 2158]	2362	[2373, 2681]
50	[100, 101]	821	[566, 1337]	1592	[1183, 2159]	2363	[2682, 2683]
51	[102, 103]	822	[1338, 1339]	1593	[2160, 1144]	2364	[2684, 2685]
52	[104, 105]	823	[1340, 797]	1594	[2161, 2084]	2365	[2686, 2687]
53	[106, 107]	824	[1341, 142]	1595	[917, 1047]	2366	[2028, 1239]
54	[108, 109]	825	[1342, 1343]	1596	[1204, 2162]	2367	[2095, 267]
55	[110, 111]	826	[1344, 1345]	1597	[900, 2163]	2368	[2000, 2320]
56	[112, 113]	827	[1346, 1347]	1598	[1905, 2031]	2369	[1197, 2688]
57	[114, 115]	828	[1348, 608]	1599	[2164, 2165]	2370	[2045, 1939]
58	[116, 117]	829	[1349, 1350]	1600	[2166, 1003]	2371	[983, 988]
59	[118, 119]	830	[1351, 208]	1601	[1113, 1192]	2372	[2689, 992]
60	[120, 121]	831	[721, 1352]	1602	[2074, 1175]	2373	[2029, 1027]
61	[93, 122]	832	[1353, 1354]	1603	[822, 910]	2374	[2082, 1215]
62	[123, 124]	833	[593, 1355]	1604	[1097, 2142]	2375	[2690, 2357]
63	[125, 126]	834	[1356, 738]	1605	[2091, 2167]	2376	[836, 2350]
64	[127, 128]	835	[164, 1357]	1606	[1264, 1999]	2377	[2691, 2205]
65	[129, 130]	836	[1358, 1359]	1607	[2168, 1200]	2378	[2063, 2692]
66	[131, 132]	837	[1360, 547]	1608	[30, 923]	2379	[2684, 2693]
67	[133, 134]	838	[1361, 581]	1609	[1910, 2099]	2380	[2694, 113]
68	[135, 136]	839	[1362, 494]	1610	[2074, 2169]	2381	[1175, 2695]
69	[137, 138]	840	[1334, 49]	1611	[1947, 407]	2382	[1985, 1266]
70	[139, 140]	841	[1363, 1364]	1612	[248, 362]	2383	[899, 2696]
71	[141, 142]	842	[604, 1365]	1613	[2170, 1272]	2384	[941, 2697]
72	[143, 144]	843	[1366, 1367]	1614	[2171, 1077]	2385	[85, 2698]

73	[145, 146]	844	[1368, 1369]	1615	[1886, 1147]	2386	[1898, 1242]
74	[147, 148]	845	[522, 1370]	1616	[2172, 2173]	2387	[2699, 1272]
75	[61, 149]	846	[32, 1371]	1617	[2174, 2175]	2388	[2700, 1141]
76	[150, 151]	847	[1372, 577]	1618	[1900, 336]	2389	[2701, 2067]
77	[152, 153]	848	[1373, 1374]	1619	[70, 2048]	2390	[2172, 2702]
78	[154, 155]	849	[554, 1375]	1620	[2176, 267]	2391	[340, 2703]
79	[156, 157]	850	[1376, 1377]	1621	[2177, 2178]	2392	[2087, 2081]
80	[158, 159]	851	[761, 1378]	1622	[2179, 2180]	2393	[2704, 2022]
81	[160, 161]	852	[587, 1379]	1623	[2154, 1127]	2394	[2705, 935]
82	[162, 163]	853	[1380, 1381]	1624	[2181, 2182]	2395	[2706, 350]
83	[164, 165]	854	[1382, 512]	1625	[2183, 1942]	2396	[2707, 2708]
84	[166, 167]	855	[1383, 643]	1626	[2154, 2184]	2397	[2021, 1914]
85	[168, 169]	856	[1384, 472]	1627	[1009, 293]	2398	[2272, 1191]
86	[170, 171]	857	[1385, 1386]	1628	[2185, 2186]	2399	[2158, 1017]
87	[172, 173]	858	[162, 1387]	1629	[2187, 2123]	2400	[2312, 305]
88	[174, 175]	859	[1388, 1389]	1630	[2176, 2188]	2401	[375, 1298]
89	[176, 177]	860	[227, 1390]	1631	[2189, 2190]	2402	[2301, 2709]
90	[178, 179]	861	[1391, 1392]	1632	[929, 2191]	2403	[2323, 355]
91	[180, 181]	862	[1393, 1394]	1633	[934, 2192]	2404	[67, 971]
92	[182, 183]	863	[764, 1395]	1634	[2193, 2194]	2405	[907, 911]
93	[184, 185]	864	[1396, 1397]	1635	[2195, 1903]	2406	[2221, 1962]
94	[186, 187]	865	[231, 1398]	1636	[394, 1299]	2407	[2237, 902]
95	[188, 189]	866	[48, 1399]	1637	[2196, 1080]	2408	[106, 2148]
96	[190, 191]	867	[1400, 1322]	1638	[1019, 2197]	2409	[982, 987]
97	[192, 193]	868	[1401, 1352]	1639	[984, 2198]	2410	[1036, 2710]
98	[194, 195]	869	[1402, 668]	1640	[2199, 1159]	2411	[2181, 1934]
99	[196, 185]	870	[719, 1403]	1641	[2195, 2200]	2412	[2711, 2222]
100	[197, 198]	871	[1404, 575]	1642	[2188, 2201]	2413	[2712, 2165]
101	[199, 200]	872	[1405, 1406]	1643	[808, 966]	2414	[4, 2062]
102	[201, 202]	873	[1407, 1408]	1644	[1267, 1248]	2415	[845, 2700]
103	[203, 204]	874	[1376, 1409]	1645	[2202, 2191]	2416	[1047, 895]
104	[205, 206]	875	[1410, 1411]	1646	[2203, 2204]	2417	[2041, 1068]
105	[207, 208]	876	[658, 1412]	1647	[1897, 1241]	2418	[1054, 1183]
106	[209, 210]	877	[1413, 705]	1648	[1937, 1277]	2419	[2169, 1176]
107	[211, 212]	878	[1414, 1415]	1649	[899, 2205]	2420	[876, 2713]
108	[213, 214]	879	[1416, 1417]	1650	[988, 286]	2421	[817, 2161]
109	[215, 216]	880	[182, 579]	1651	[98, 2206]	2422	[1934, 2241]
110	[217, 218]	881	[1418, 736]	1652	[2207, 1102]	2423	[419, 2714]
111	[219, 144]	882	[1419, 1420]	1653	[1190, 1073]	2424	[2031, 855]
112	[220, 221]	883	[1421, 1422]	1654	[1166, 842]	2425	[349, 2715]
113	[222, 223]	884	[1423, 1415]	1655	[2044, 1949]	2426	[2347, 1896]
114	[224, 225]	885	[130, 1379]	1656	[2208, 949]	2427	[2716, 1978]
115	[226, 227]	886	[1424, 1425]	1657	[2209, 2210]	2428	[1106, 2308]
116	[228, 229]	887	[1426, 1427]	1658	[2211, 2212]	2429	[1030, 272]

117	[230, 231]	888	[1428, 1429]	1659	[2149, 2213]	2430	[1167, 843]
118	[232, 233]	889	[1430, 1431]	1660	[2214, 2215]	2431	[2209, 2717]
119	[234, 235]	890	[1432, 409]	1661	[2216, 288]	2432	[2257, 2718]
120	[236, 237]	891	[1361, 1433]	1662	[1074, 1927]	2433	[2719, 2709]
121	[238, 239]	892	[1434, 1435]	1663	[830, 1021]	2434	[897, 2115]
122	[183, 240]	893	[1436, 1437]	1664	[2217, 67]	2435	[2289, 2720]
123	[241, 242]	894	[626, 1438]	1665	[1258, 2218]	2436	[881, 2136]
124	[243, 223]	895	[1345, 193]	1666	[2219, 2220]	2437	[1039, 2721]
125	[244, 245]	896	[799, 1439]	1667	[1149, 1035]	2438	[2722, 1197]
126	[246, 247]	897	[1440, 1441]	1668	[2221, 2096]	2439	[2174, 844]
127	[248, 249]	898	[464, 1442]	1669	[2067, 2222]	2440	[1998, 1085]
128	[250, 251]	899	[1443, 516]	1670	[1958, 2223]	2441	[2723, 2186]
129	[114, 252]	900	[1444, 1445]	1671	[2224, 2225]	2442	[2724, 903]
130	[253, 254]	901	[1446, 1447]	1672	[2126, 2226]	2443	[356, 360]
131	[255, 256]	902	[1448, 1449]	1673	[2227, 956]	2444	[2143, 888]
132	[257, 258]	903	[241, 180]	1674	[917, 444]	2445	[887, 2725]
133	[259, 88]	904	[1450, 744]	1675	[2120, 2228]	2446	[2277, 996]
134	[260, 261]	905	[1451, 1452]	1676	[2229, 1285]	2447	[1956, 1203]
135	[262, 263]	906	[1453, 1454]	1677	[2230, 1310]	2448	[1160, 2726]
136	[102, 264]	907	[1455, 1456]	1678	[1263, 1998]	2449	[2292, 1061]
137	[265, 266]	908	[1457, 1458]	1679	[1886, 1178]	2450	[2727, 1970]
138	[267, 268]	909	[1459, 173]	1680	[2231, 1302]	2451	[2728, 2729]
139	[269, 270]	910	[1460, 1425]	1681	[2187, 1119]	2452	[2267, 889]
140	[271, 272]	911	[483, 1461]	1682	[2232, 2014]	2453	[2730, 990]
141	[273, 274]	912	[1456, 701]	1683	[2132, 2071]	2454	[1943, 2731]
142	[275, 276]	913	[1462, 680]	1684	[2233, 1918]	2455	[2732, 1208]
143	[277, 278]	914	[1463, 53]	1685	[74, 2234]	2456	[1190, 2733]
144	[279, 280]	915	[12, 492]	1686	[298, 1992]	2457	[850, 440]
145	[281, 114]	916	[1395, 1464]	1687	[2065, 1106]	2458	[418, 2159]
146	[282, 283]	917	[796, 1345]	1688	[925, 2235]	2459	[2734, 1886]
147	[284, 285]	918	[544, 60]	1689	[2236, 2059]	2460	[2247, 2735]
148	[286, 287]	919	[1414, 1465]	1690	[376, 2237]	2461	[2736, 442]
149	[288, 289]	920	[1466, 1467]	1691	[2238, 1305]	2462	[2737, 400]
150	[290, 291]	921	[1468, 191]	1692	[2239, 2240]	2463	[2738, 425]
151	[292, 293]	922	[1469, 1470]	1693	[446, 307]	2464	[2045, 2727]
152	[294, 295]	923	[60, 1471]	1694	[2182, 2241]	2465	[867, 1139]
153	[71, 296]	924	[1472, 1473]	1695	[2242, 2141]	2466	[2739, 365]
154	[297, 298]	925	[543, 59]	1696	[2243, 1304]	2467	[2740, 341]
155	[299, 300]	926	[1474, 1475]	1697	[2244, 2245]	2468	[414, 2153]
156	[301, 302]	927	[1476, 1477]	1698	[2023, 1145]	2469	[1129, 2155]
157	[303, 304]	928	[620, 1478]	1699	[2246, 406]	2470	[2278, 2741]
158	[305, 306]	929	[1479, 1480]	1700	[2021, 334]	2471	[2742, 1887]
159	[307, 27]	930	[1481, 679]	1701	[2247, 866]	2472	[2214, 2743]
160	[308, 309]	931	[1482, 1483]	1702	[1122, 2248]	2473	[1244, 1211]

161	[310, 311]	932	[1484, 1485]	1703	[2249, 18]	2474	[82, 2744]
162	[312, 313]	933	[1486, 1440]	1704	[1238, 1217]	2475	[2745, 2746]
163	[314, 99]	934	[1421, 533]	1705	[2250, 2040]	2476	[971, 2747]
164	[315, 316]	935	[1487, 189]	1706	[847, 2187]	2477	[2748, 924]
165	[317, 318]	936	[1488, 1489]	1707	[346, 2251]	2478	[453, 2050]
166	[319, 320]	937	[1490, 212]	1708	[2252, 1182]	2479	[2749, 1185]
167	[321, 322]	938	[1368, 1491]	1709	[2253, 2064]	2480	[1095, 2750]
168	[323, 324]	939	[749, 1492]	1710	[2254, 2255]	2481	[2751, 1191]
169	[325, 326]	940	[533, 203]	1711	[1105, 2002]	2482	[2752, 2706]
170	[327, 328]	941	[1493, 1494]	1712	[1136, 1116]	2483	[1094, 2753]
171	[329, 330]	942	[1495, 1496]	1713	[2256, 2106]	2484	[2754, 918]
172	[331, 332]	943	[731, 1497]	1714	[2257, 2258]	2485	[1957, 2271]
173	[333, 276]	944	[1498, 1499]	1715	[4, 2259]	2486	[2755, 2058]
174	[334, 335]	945	[35, 1500]	1716	[1957, 2260]	2487	[2107, 351]
175	[316, 336]	946	[1501, 777]	1717	[2261, 1055]	2488	[2756, 2353]
176	[337, 338]	947	[225, 781]	1718	[2262, 289]	2489	[2757, 2106]
177	[339, 340]	948	[55, 1502]	1719	[2263, 994]	2490	[2758, 1040]
178	[341, 342]	949	[1503, 1504]	1720	[2264, 1034]	2491	[2759, 877]
179	[343, 108]	950	[56, 1505]	1721	[2265, 2168]	2492	[975, 1152]
180	[268, 344]	951	[797, 1506]	1722	[1196, 260]	2493	[2760, 2122]
181	[345, 346]	952	[1507, 646]	1723	[1961, 2227]	2494	[2761, 2220]
182	[347, 348]	953	[198, 1508]	1724	[2266, 848]	2495	[2222, 377]
183	[349, 350]	954	[1509, 1510]	1725	[1052, 1308]	2496	[947, 2074]
184	[351, 352]	955	[1511, 1512]	1726	[2267, 1229]	2497	[2762, 1157]
185	[353, 354]	956	[1513, 668]	1727	[1260, 2268]	2498	[1025, 2763]
186	[110, 355]	957	[1514, 663]	1728	[1130, 2269]	2499	[1962, 2764]
187	[356, 70]	958	[662, 1515]	1729	[2270, 1100]	2500	[2135, 69]
188	[357, 358]	959	[1516, 1517]	1730	[1214, 1905]	2501	[2765, 2043]
189	[262, 359]	960	[668, 1518]	1731	[1203, 2271]	2502	[2147, 1946]
190	[360, 361]	961	[1519, 1409]	1732	[2272, 1113]	2503	[118, 2250]
191	[362, 363]	962	[1520, 538]	1733	[939, 2273]	2504	[68, 2747]
192	[364, 365]	963	[136, 1521]	1734	[2274, 2119]	2505	[347, 849]
193	[366, 367]	964	[1522, 1523]	1735	[829, 2275]	2506	[2766, 2204]
194	[368, 369]	965	[570, 715]	1736	[1038, 1149]	2507	[109, 2767]
195	[370, 371]	966	[1524, 1525]	1737	[2276, 1942]	2508	[2056, 2768]
196	[64, 372]	967	[1367, 1526]	1738	[2110, 1190]	2509	[2769, 1055]
197	[269, 373]	968	[1527, 1525]	1739	[2001, 2053]	2510	[2752, 349]
198	[374, 375]	969	[1528, 1529]	1740	[806, 2129]	2511	[1942, 2770]
199	[376, 377]	970	[1343, 766]	1741	[1218, 975]	2512	[928, 253]
200	[378, 379]	971	[1530, 1526]	1742	[2277, 21]	2513	[2771, 2298]
201	[380, 381]	972	[1531, 1422]	1743	[2278, 2279]	2514	[2772, 1039]
202	[382, 383]	973	[524, 1532]	1744	[2280, 387]	2515	[2773, 119]
203	[341, 384]	974	[1533, 460]	1745	[2281, 1997]	2516	[2189, 2774]
204	[385, 386]	975	[763, 230]	1746	[2067, 376]	2517	[2686, 2775]

205	[387, 388]	976	[1534, 778]	1747	[1082, 2282]	2518	[2334, 2009]
206	[389, 390]	977	[1535, 1536]	1748	[819, 2283]	2519	[2776, 928]
207	[391, 392]	978	[1389, 1537]	1749	[413, 2161]	2520	[2704, 90]
208	[393, 394]	979	[153, 674]	1750	[425, 1017]	2521	[1098, 808]
209	[395, 78]	980	[1538, 1539]	1751	[2284, 953]	2522	[2230, 2777]
210	[396, 397]	981	[224, 780]	1752	[2285, 826]	2523	[2778, 375]
211	[398, 399]	982	[1540, 1541]	1753	[2134, 2286]	2524	[1981, 357]
212	[284, 400]	983	[1542, 530]	1754	[283, 1188]	2525	[1210, 2779]
213	[401, 402]	984	[733, 1543]	1755	[1889, 887]	2526	[2102, 2780]
214	[403, 404]	985	[738, 1544]	1756	[960, 2157]	2527	[2781, 2142]
215	[405, 406]	986	[1545, 667]	1757	[933, 1240]	2528	[1943, 2782]
216	[407, 408]	987	[710, 1546]	1758	[2287, 926]	2529	[2783, 2784]
217	[409, 410]	988	[1541, 632]	1759	[64, 1003]	2530	[864, 2785]
218	[411, 412]	989	[794, 1547]	1760	[1135, 1928]	2531	[2786, 1306]
219	[413, 414]	990	[1548, 1385]	1761	[2037, 2168]	2532	[858, 2787]
220	[415, 416]	991	[613, 1463]	1762	[2288, 25]	2533	[2788, 388]
221	[417, 418]	992	[1549, 1550]	1763	[23, 2247]	2534	[2789, 370]
222	[419, 420]	993	[1355, 1551]	1764	[2289, 1154]	2535	[956, 1084]
223	[421, 254]	994	[1552, 200]	1765	[2148, 1123]	2536	[2280, 2788]
224	[422, 423]	995	[14, 1553]	1766	[1266, 884]	2537	[1904, 2790]
225	[424, 425]	996	[1554, 1324]	1767	[2290, 2212]	2538	[2791, 2792]
226	[426, 427]	997	[480, 1555]	1768	[2117, 2291]	2539	[1211, 2793]
227	[428, 65]	998	[652, 745]	1769	[2084, 2154]	2540	[2794, 1071]
228	[429, 430]	999	[702, 747]	1770	[2292, 978]	2541	[2795, 2126]
229	[431, 432]	1000	[1556, 1557]	1771	[883, 2293]	2542	[2071, 2796]
230	[290, 433]	1001	[1470, 1512]	1772	[96, 2294]	2543	[1124, 1929]
231	[434, 435]	1002	[1558, 33]	1773	[2295, 323]	2544	[1940, 2797]
232	[422, 436]	1003	[126, 1559]	1774	[2296, 889]	2545	[1016, 250]
233	[437, 438]	1004	[1560, 1561]	1775	[2179, 2297]	2546	[249, 2798]
234	[304, 439]	1005	[1562, 1563]	1776	[75, 2298]	2547	[889, 2799]
235	[440, 441]	1006	[684, 1564]	1777	[2299, 1079]	2548	[1940, 2800]
236	[312, 442]	1007	[1565, 1566]	1778	[327, 2300]	2549	[2783, 2801]
237	[443, 444]	1008	[588, 1567]	1779	[2203, 2214]	2550	[1249, 1906]
238	[445, 330]	1009	[1568, 42]	1780	[1056, 26]	2551	[257, 932]
239	[446, 447]	1010	[1569, 771]	1781	[2301, 2302]	2552	[2020, 1069]
240	[348, 448]	1011	[1570, 541]	1782	[2286, 68]	2553	[2185, 2295]
241	[449, 345]	1012	[1571, 1572]	1783	[1977, 2303]	2554	[1290, 2802]
242	[450, 451]	1013	[695, 1479]	1784	[2304, 2225]	2555	[1296, 2130]
243	[452, 453]	1014	[1573, 1574]	1785	[2085, 2282]	2556	[447, 382]
244	[454, 455]	1015	[1575, 1576]	1786	[1300, 2032]	2557	[2344, 2803]
245	[456, 457]	1016	[1577, 1578]	1787	[2193, 914]	2558	[2321, 984]
246	[212, 458]	1017	[764, 231]	1788	[2305, 447]	2559	[2804, 945]
247	[459, 460]	1018	[766, 137]	1789	[2306, 1103]	2560	[2805, 1916]
248	[461, 462]	1019	[1579, 1580]	1790	[1119, 2307]	2561	[2806, 1256]

249	[463, 464]	1020	[1581, 1582]	1791	[1222, 2308]	2562	[2065, 1222]
250	[465, 466]	1021	[1371, 1583]	1792	[316, 1110]	2563	[1287, 2807]
251	[467, 468]	1022	[1584, 1366]	1793	[2309, 2095]	2564	[993, 2808]
252	[469, 470]	1023	[1585, 1586]	1794	[1996, 2310]	2565	[2809, 1024]
253	[471, 472]	1024	[1587, 1588]	1795	[1088, 255]	2566	[1917, 2336]
254	[473, 474]	1025	[1589, 1590]	1796	[2161, 2153]	2567	[994, 89]
255	[475, 476]	1026	[1591, 1592]	1797	[2311, 2180]	2568	[2810, 2787]
256	[477, 478]	1027	[738, 1593]	1798	[978, 1062]	2569	[986, 2332]
257	[479, 480]	1028	[1594, 474]	1799	[2312, 1302]	2570	[2811, 2812]
258	[481, 482]	1029	[1595, 654]	1800	[1233, 2313]	2571	[265, 1031]
259	[483, 484]	1030	[1596, 1364]	1801	[2314, 2315]	2572	[979, 2813]
260	[485, 486]	1031	[1597, 607]	1802	[2258, 2066]	2573	[844, 2814]
261	[487, 488]	1032	[681, 1598]	1803	[2072, 2315]	2574	[2038, 1200]
262	[489, 490]	1033	[1472, 1599]	1804	[330, 97]	2575	[120, 2815]
263	[491, 492]	1034	[1582, 1600]	1805	[1168, 1224]	2576	[381, 2808]
264	[493, 494]	1035	[1589, 1572]	1806	[26, 356]	2577	[903, 90]
265	[495, 496]	1036	[1554, 1601]	1807	[112, 2316]	2578	[2284, 1077]
266	[497, 498]	1037	[1602, 1603]	1808	[1146, 1167]	2579	[1099, 2816]
267	[499, 500]	1038	[1604, 1589]	1809	[2027, 1250]	2580	[996, 2817]
268	[501, 502]	1039	[1605, 1606]	1810	[2317, 2167]	2581	[1041, 875]
269	[475, 503]	1040	[1607, 723]	1811	[2318, 2319]	2582	[2144, 105]
270	[504, 496]	1041	[1484, 1349]	1812	[2320, 2053]	2583	[2818, 2819]
271	[505, 506]	1042	[1400, 1474]	1813	[2321, 871]	2584	[2820, 328]
272	[507, 216]	1043	[1608, 549]	1814	[2322, 2323]	2585	[2755, 398]
273	[508, 509]	1044	[1609, 1382]	1815	[1076, 878]	2586	[2821, 2345]
274	[510, 511]	1045	[1610, 669]	1816	[383, 950]	2587	[1944, 861]
275	[512, 513]	1046	[1611, 215]	1817	[2290, 2324]	2588	[2822, 2823]
276	[514, 515]	1047	[1612, 1613]	1818	[980, 346]	2589	[2155, 2824]
277	[516, 517]	1048	[43, 1614]	1819	[1200, 1254]	2590	[2825, 2096]
278	[140, 491]	1049	[1592, 640]	1820	[2325, 452]	2591	[2129, 2826]
279	[518, 519]	1050	[1615, 682]	1821	[2326, 1007]	2592	[2699, 2827]
280	[520, 521]	1051	[1616, 130]	1822	[1003, 1271]	2593	[2814, 2700]
281	[522, 523]	1052	[455, 1430]	1823	[1250, 2327]	2594	[268, 2828]
282	[524, 209]	1053	[1617, 1618]	1824	[2150, 1128]	2595	[2309, 2176]
283	[525, 526]	1054	[1339, 1619]	1825	[1301, 2208]	2596	[2199, 905]
284	[527, 528]	1055	[614, 53]	1826	[2328, 1210]	2597	[2829, 2210]
285	[529, 57]	1056	[1620, 137]	1827	[833, 2329]	2598	[1069, 334]
286	[530, 531]	1057	[1621, 56]	1828	[271, 2330]	2599	[1896, 2830]
287	[532, 488]	1058	[1622, 1623]	1829	[1241, 2331]	2600	[1088, 2831]
288	[533, 534]	1059	[1624, 1625]	1830	[357, 2332]	2601	[258, 997]
289	[535, 536]	1060	[1626, 167]	1831	[16, 1955]	2602	[2188, 268]
290	[537, 177]	1061	[156, 1627]	1832	[1992, 2333]	2603	[895, 2756]
291	[538, 127]	1062	[1628, 1629]	1833	[1988, 1973]	2604	[1297, 2755]
292	[516, 539]	1063	[1630, 1631]	1834	[1971, 2319]	2605	[2276, 831]

293	[540, 541]	1064	[674, 1632]	1835	[1230, 881]	2606	[2718, 2066]
294	[13, 542]	1065	[1633, 8]	1836	[2334, 297]	2607	[1277, 2832]
295	[543, 544]	1066	[1634, 1331]	1837	[1067, 287]	2608	[2827, 2354]
296	[58, 545]	1067	[232, 481]	1838	[2335, 812]	2609	[1984, 1265]
297	[546, 547]	1068	[1323, 1635]	1839	[2053, 1104]	2610	[2833, 29]
298	[548, 549]	1069	[1562, 1636]	1840	[2129, 2336]	2611	[993, 2834]
299	[550, 551]	1070	[781, 1637]	1841	[874, 77]	2612	[891, 2234]
300	[552, 553]	1071	[1638, 1578]	1842	[2337, 2045]	2613	[2835, 828]
301	[554, 555]	1072	[1639, 1618]	1843	[2013, 2338]	2614	[366, 2836]
302	[556, 557]	1073	[1640, 509]	1844	[2339, 1051]	2615	[1999, 2837]
303	[558, 559]	1074	[1641, 1447]	1845	[1293, 2068]	2616	[2838, 942]
304	[560, 561]	1075	[187, 1339]	1846	[1227, 1076]	2617	[2839, 2103]
305	[236, 562]	1076	[186, 1338]	1847	[976, 904]	2618	[2315, 1277]
306	[563, 564]	1077	[1642, 1643]	1848	[991, 2340]	2619	[1991, 2811]
307	[565, 57]	1078	[463, 1644]	1849	[2254, 2341]	2620	[2840, 815]
308	[566, 567]	1079	[36, 1645]	1850	[1982, 2342]	2621	[2201, 344]
309	[568, 569]	1080	[1646, 539]	1851	[2229, 2343]	2622	[1117, 282]
310	[570, 571]	1081	[1647, 1648]	1852	[2344, 2345]	2623	[2841, 2251]
311	[572, 573]	1082	[1649, 239]	1853	[1014, 1974]	2624	[2811, 2333]
312	[184, 574]	1083	[242, 181]	1854	[1095, 2346]	2625	[2005, 2842]
313	[575, 576]	1084	[1650, 677]	1855	[2347, 1199]	2626	[1046, 1186]
314	[577, 578]	1085	[1651, 1652]	1856	[2348, 1959]	2627	[1228, 878]
315	[579, 580]	1086	[692, 1653]	1857	[2155, 1907]	2628	[927, 965]
316	[581, 582]	1087	[1654, 475]	1858	[2349, 2350]	2629	[2745, 2823]
317	[583, 584]	1088	[1655, 1656]	1859	[2251, 1042]	2630	[2843, 2006]
318	[585, 586]	1089	[1390, 1657]	1860	[332, 250]	2631	[2844, 24]
319	[129, 587]	1090	[1349, 1658]	1861	[1110, 2011]	2632	[1208, 2768]
320	[588, 589]	1091	[1659, 685]	1862	[886, 2351]	2633	[1148, 2845]
321	[590, 211]	1092	[1660, 605]	1863	[920, 886]	2634	[434, 2846]
322	[591, 592]	1093	[1661, 1662]	1864	[2352, 1955]	2635	[1084, 2032]
323	[593, 594]	1094	[1663, 1664]	1865	[82, 2353]	2636	[990, 2847]
324	[595, 596]	1095	[1665, 151]	1866	[1923, 271]	2637	[2848, 2107]
325	[597, 598]	1096	[1437, 1666]	1867	[1055, 25]	2638	[2175, 2814]
326	[599, 600]	1097	[1667, 1668]	1868	[1272, 2354]	2639	[2244, 2849]
327	[601, 602]	1098	[1669, 1499]	1869	[2355, 2007]	2640	[2850, 74]
328	[603, 604]	1099	[1670, 1671]	1870	[2356, 993]	2641	[1077, 2851]
329	[605, 606]	1100	[1672, 1673]	1871	[943, 2357]	2642	[1974, 2852]
330	[607, 608]	1101	[1609, 1674]	1872	[1150, 1943]	2643	[346, 1169]
331	[609, 610]	1102	[1675, 1374]	1873	[2358, 1297]	2644	[2757, 1989]
332	[611, 467]	1103	[1676, 1677]	1874	[1298, 2359]	2645	[964, 2853]
333	[612, 236]	1104	[1678, 1679]	1875	[1193, 397]	2646	[2854, 384]
334	[613, 614]	1105	[689, 1680]	1876	[266, 1948]	2647	[1133, 2772]
335	[615, 616]	1106	[1390, 32]	1877	[2360, 110]	2648	[2360, 2323]
336	[617, 618]	1107	[553, 1408]	1878	[2135, 356]	2649	[2186, 1206]

337	[619, 620]	1108	[1681, 1682]	1879	[2085, 2361]	2650	[332, 873]
338	[621, 622]	1109	[1683, 1684]	1880	[2362, 1305]	2651	[412, 1195]
339	[623, 624]	1110	[1685, 1686]	1881	[297, 1991]	2652	[915, 345]
340	[625, 600]	1111	[1687, 785]	1882	[1087, 1040]	2653	[2855, 2151]
341	[626, 627]	1112	[1688, 1340]	1883	[2140, 2363]	2654	[2856, 2036]
342	[628, 538]	1113	[1488, 1689]	1884	[2108, 30]	2655	[2073, 2857]
343	[629, 630]	1114	[1690, 1543]	1885	[1738, 1755]	2656	[2858, 2763]
344	[631, 632]	1115	[678, 1691]	1886	[1427, 1725]	2657	[2859, 2860]
345	[14, 633]	1116	[1692, 507]	1887	[1653, 508]	2658	[2258, 2701]
346	[634, 635]	1117	[1693, 1694]	1888	[1678, 1426]	2659	[1283, 1252]
347	[636, 637]	1118	[578, 1695]	1889	[1839, 1428]	2660	[1888, 2012]
348	[638, 639]	1119	[194, 1696]	1890	[1558, 2364]	2661	[2125, 2859]
349	[640, 641]	1120	[1697, 720]	1891	[2365, 1876]	2662	[1306, 438]
350	[642, 643]	1121	[1698, 1699]	1892	[1458, 2366]	2663	[2861, 2116]
351	[527, 644]	1122	[1556, 1389]	1893	[1385, 2367]	2664	[2707, 2792]
352	[645, 646]	1123	[1700, 1701]	1894	[1871, 710]	2665	[2204, 2215]
353	[647, 648]	1124	[1702, 1498]	1895	[2368, 199]	2666	[116, 2862]
354	[649, 650]	1125	[147, 1703]	1896	[2369, 2370]	2667	[2177, 2863]
355	[651, 545]	1126	[748, 1704]	1897	[571, 1818]	2668	[2168, 1253]
356	[652, 653]	1127	[789, 1705]	1898	[573, 2371]	2669	[813, 1923]
357	[654, 655]	1128	[1706, 1493]	1899	[1448, 2372]	2670	[1950, 2321]
358	[656, 126]	1129	[1707, 1705]	1900	[2373, 2374]	2671	[2126, 2860]
359	[657, 634]	1130	[506, 1708]	1901	[1753, 2375]	2672	[880, 395]
360	[658, 659]	1131	[480, 1709]	1902	[1550, 2376]	2673	[2864, 2849]
361	[660, 661]	1132	[1710, 803]	1903	[1861, 1386]	2674	[2127, 2865]
362	[662, 663]	1133	[767, 1605]	1904	[170, 2377]	2675	[305, 1303]
363	[664, 62]	1134	[542, 633]	1905	[1564, 1872]	2676	[1953, 2852]
364	[471, 665]	1135	[1693, 1406]	1906	[2378, 1682]	2677	[1988, 840]
365	[666, 667]	1136	[126, 1711]	1907	[2379, 2380]	2678	[291, 2866]
366	[668, 669]	1137	[1712, 1327]	1908	[2381, 2382]	2679	[2867, 2775]
367	[670, 671]	1138	[635, 1713]	1909	[2383, 47]	2680	[2728, 2868]
368	[672, 576]	1139	[1714, 704]	1910	[1794, 1710]	2681	[2869, 1952]
369	[673, 674]	1140	[1715, 462]	1911	[2384, 530]	2682	[2786, 437]
370	[612, 675]	1141	[1716, 227]	1912	[601, 787]	2683	[952, 1057]
371	[676, 677]	1142	[505, 1717]	1913	[2385, 724]	2684	[178, 2870]
372	[678, 679]	1143	[1718, 1719]	1914	[1635, 2386]	2685	[2871, 675]
373	[680, 681]	1144	[539, 1720]	1915	[2387, 132]	2686	[1355, 2872]
374	[682, 683]	1145	[1339, 1721]	1916	[2370, 639]	2687	[622, 1508]
375	[684, 685]	1146	[1722, 586]	1917	[1879, 2388]	2688	[2873, 480]
376	[468, 686]	1147	[1723, 1724]	1918	[1444, 2389]	2689	[1635, 2874]
377	[687, 688]	1148	[1725, 1454]	1919	[2390, 58]	2690	[754, 2875]
378	[689, 690]	1149	[1726, 1579]	1920	[2391, 52]	2691	[1528, 1598]
379	[691, 692]	1150	[1727, 596]	1921	[675, 562]	2692	[2876, 2495]
380	[651, 693]	1151	[1728, 1729]	1922	[2392, 470]	2693	[2424, 1789]

381	[694, 695]	1152	[1462, 1730]	1923	[1611, 507]	2694	[1649, 2642]
382	[696, 697]	1153	[476, 1731]	1924	[2393, 2394]	2695	[2877, 32]
383	[698, 699]	1154	[1732, 707]	1925	[1392, 2395]	2696	[2878, 229]
384	[700, 701]	1155	[1733, 1734]	1926	[587, 1328]	2697	[2879, 721]
385	[702, 703]	1156	[466, 1531]	1927	[1502, 1505]	2698	[167, 483]
386	[704, 705]	1157	[1735, 515]	1928	[212, 1420]	2699	[614, 2675]
387	[706, 707]	1158	[1736, 1737]	1929	[2396, 526]	2700	[2880, 1625]
388	[708, 709]	1159	[509, 1738]	1930	[1550, 1796]	2701	[145, 2540]
389	[710, 711]	1160	[1725, 1313]	1931	[2397, 566]	2702	[2881, 1878]
390	[518, 712]	1161	[1739, 1740]	1932	[534, 204]	2703	[2498, 1750]
391	[640, 713]	1162	[188, 1741]	1933	[211, 1419]	2704	[2418, 564]
392	[714, 715]	1163	[1623, 1467]	1934	[1670, 1582]	2705	[1843, 2882]
393	[716, 717]	1164	[706, 1554]	1935	[2398, 2399]	2706	[2883, 2567]
394	[718, 650]	1165	[1742, 1375]	1936	[2400, 614]	2707	[1605, 2884]
395	[719, 720]	1166	[1667, 1366]	1937	[2401, 1857]	2708	[2885, 1441]
396	[721, 722]	1167	[1743, 1744]	1938	[2402, 2403]	2709	[1324, 2501]
397	[490, 723]	1168	[1456, 1745]	1939	[2404, 2380]	2710	[608, 605]
398	[636, 463]	1169	[633, 1608]	1940	[1342, 765]	2711	[1437, 2602]
399	[724, 709]	1170	[635, 1662]	1941	[1769, 2405]	2712	[1522, 2886]
400	[725, 726]	1171	[1746, 1747]	1942	[1771, 704]	2713	[2887, 2587]
401	[495, 727]	1172	[1748, 1749]	1943	[1579, 740]	2714	[2565, 712]
402	[728, 729]	1173	[1737, 1667]	1944	[2406, 1393]	2715	[2888, 47]
403	[730, 731]	1174	[752, 604]	1945	[1749, 1550]	2716	[730, 2510]
404	[732, 136]	1175	[781, 1750]	1946	[768, 1606]	2717	[2889, 1627]
405	[733, 734]	1176	[1751, 1752]	1947	[1726, 739]	2718	[1630, 1437]
406	[735, 736]	1177	[1753, 1754]	1948	[2407, 516]	2719	[2470, 1868]
407	[737, 738]	1178	[1755, 1653]	1949	[2408, 159]	2720	[2890, 2891]
408	[739, 740]	1179	[745, 1756]	1950	[2409, 1404]	2721	[2564, 697]
409	[409, 409]	1180	[177, 1757]	1951	[154, 1685]	2722	[2505, 2873]
410	[741, 742]	1181	[1685, 1758]	1952	[1633, 1837]	2723	[1458, 2892]
411	[579, 240]	1182	[1657, 1759]	1953	[2410, 2411]	2724	[1647, 2465]
412	[743, 744]	1183	[731, 182]	1954	[776, 2412]	2725	[2893, 1652]
413	[745, 746]	1184	[753, 1365]	1955	[32, 1759]	2726	[2894, 2388]
414	[747, 748]	1185	[1760, 163]	1956	[1642, 2413]	2727	[2648, 2895]
415	[749, 750]	1186	[695, 1761]	1957	[679, 2414]	2728	[1840, 1767]
416	[751, 225]	1187	[461, 1762]	1958	[141, 2415]	2729	[1315, 1738]
417	[752, 753]	1188	[1763, 1764]	1959	[2416, 762]	2730	[1612, 2896]
418	[754, 755]	1189	[1765, 1766]	1960	[2417, 1712]	2731	[2897, 2582]
419	[501, 756]	1190	[1767, 455]	1961	[2418, 2419]	2732	[1509, 2898]
420	[757, 758]	1191	[1768, 1769]	1962	[2420, 2421]	2733	[2899, 1680]
421	[759, 760]	1192	[1770, 575]	1963	[2422, 635]	2734	[1841, 2900]
422	[217, 761]	1193	[1771, 1413]	1964	[2423, 686]	2735	[2901, 2669]
423	[655, 762]	1194	[1772, 1656]	1965	[1382, 2424]	2736	[618, 590]
424	[763, 764]	1195	[1773, 618]	1966	[2425, 134]	2737	[2546, 1822]

425	[765, 766]	1196	[1541, 1774]	1967	[2426, 2427]	2738	[1796, 2902]
426	[571, 527]	1197	[1775, 521]	1968	[1391, 1718]	2739	[759, 2903]
427	[767, 768]	1198	[1620, 1776]	1969	[2428, 1476]	2740	[1643, 2904]
428	[769, 131]	1199	[1494, 1777]	1970	[1677, 2429]	2741	[521, 2654]
429	[39, 616]	1200	[1778, 478]	1971	[2369, 638]	2742	[1790, 2905]
430	[770, 771]	1201	[1779, 607]	1972	[1803, 1869]	2743	[2906, 631]
431	[772, 773]	1202	[198, 1780]	1973	[1482, 1561]	2744	[2907, 2387]
432	[774, 775]	1203	[1781, 1782]	1974	[1479, 2430]	2745	[1827, 1649]
433	[776, 777]	1204	[1783, 1784]	1975	[2431, 2432]	2746	[584, 1689]
434	[778, 779]	1205	[1629, 1777]	1976	[696, 2433]	2747	[2908, 1844]
435	[780, 781]	1206	[1785, 1757]	1977	[1524, 2434]	2748	[1569, 2909]
436	[782, 783]	1207	[1786, 1787]	1978	[2435, 2436]	2749	[2522, 2683]
437	[784, 785]	1208	[665, 1788]	1979	[2437, 688]	2750	[2910, 463]
438	[786, 787]	1209	[634, 1661]	1980	[772, 2438]	2751	[525, 2911]
439	[788, 789]	1210	[1358, 1603]	1981	[572, 2439]	2752	[2440, 642]
440	[618, 790]	1211	[512, 1789]	1982	[2440, 1383]	2753	[476, 2637]
441	[791, 155]	1212	[1790, 1791]	1983	[2401, 794]	2754	[638, 2879]
442	[792, 778]	1213	[1466, 522]	1984	[133, 2441]	2755	[2626, 724]
443	[605, 793]	1214	[47, 1476]	1985	[2397, 2436]	2756	[795, 2890]
444	[794, 795]	1215	[1792, 1793]	1986	[655, 2442]	2757	[479, 2446]
445	[796, 192]	1216	[1794, 682]	1987	[2443, 695]	2758	[548, 2912]
446	[797, 798]	1217	[1795, 502]	1988	[1325, 2444]	2759	[139, 11]
447	[799, 726]	1218	[728, 1462]	1989	[2445, 518]	2760	[647, 2913]
448	[637, 464]	1219	[1796, 1797]	1990	[2446, 1555]	2761	[49, 2914]
449	[800, 634]	1220	[672, 1798]	1991	[1654, 2447]	2762	[1513, 1610]
450	[801, 802]	1221	[1433, 582]	1992	[547, 1354]	2763	[2415, 2915]
451	[682, 803]	1222	[1434, 1752]	1993	[2448, 1574]	2764	[2916, 2917]
452	[801, 804]	1223	[1688, 1799]	1994	[2449, 175]	2765	[1781, 2918]
453	[805, 654]	1224	[1800, 1801]	1995	[1440, 2450]	2766	[2512, 2919]
454	[244, 806]	1225	[704, 1802]	1996	[1426, 2451]	2767	[1761, 2430]
455	[807, 379]	1226	[132, 1803]	1997	[2451, 1725]	2768	[1787, 1461]
456	[808, 403]	1227	[239, 1804]	1998	[1738, 692]	2769	[765, 1620]
457	[809, 810]	1228	[1805, 1806]	1999	[1840, 1429]	2770	[2920, 2921]
458	[811, 812]	1229	[1807, 1808]	2000	[1755, 2452]	2771	[1469, 1511]
459	[813, 814]	1230	[1809, 1810]	2001	[1313, 1678]	2772	[2643, 2564]
460	[815, 359]	1231	[189, 611]	2002	[1679, 1427]	2773	[530, 2922]
461	[816, 817]	1232	[1587, 1811]	2003	[509, 691]	2774	[2376, 1797]
462	[818, 270]	1233	[1552, 1812]	2004	[1454, 1678]	2775	[2923, 1643]
463	[819, 820]	1234	[783, 1801]	2005	[1767, 1739]	2776	[2668, 759]
464	[821, 822]	1235	[1813, 1814]	2006	[1431, 1428]	2777	[2924, 1523]
465	[823, 824]	1236	[1668, 1367]	2007	[2453, 627]	2778	[2406, 1871]
466	[825, 826]	1237	[1815, 1795]	2008	[2454, 2366]	2779	[2925, 1474]
467	[827, 828]	1238	[1500, 1645]	2009	[1802, 2455]	2780	[671, 1695]
468	[452, 829]	1239	[1756, 1816]	2010	[2456, 1579]	2781	[1722, 2926]

469	[830, 317]	1240	[1485, 1350]	2011	[582, 749]	2782	[596, 2919]
470	[831, 832]	1241	[1817, 126]	2012	[2457, 2458]	2783	[1622, 1466]
471	[833, 834]	1242	[1818, 644]	2013	[1383, 2459]	2784	[2927, 1321]
472	[835, 830]	1243	[1819, 1820]	2014	[2460, 573]	2785	[2928, 1857]
473	[836, 837]	1244	[243, 1821]	2015	[1354, 1535]	2786	[33, 2560]
474	[838, 839]	1245	[1822, 717]	2016	[1545, 2461]	2787	[517, 1720]
475	[840, 841]	1246	[1823, 653]	2017	[169, 2462]	2788	[2929, 2891]
476	[842, 843]	1247	[1320, 1824]	2018	[494, 2463]	2789	[1824, 2930]
477	[844, 845]	1248	[1422, 534]	2019	[2464, 1440]	2790	[2931, 569]
478	[846, 830]	1249	[1825, 1826]	2020	[1698, 1863]	2791	[1507, 1815]
479	[847, 848]	1250	[1827, 238]	2021	[769, 2387]	2792	[2932, 2389]
480	[849, 448]	1251	[1828, 1764]	2022	[2465, 751]	2793	[2930, 670]
481	[850, 93]	1252	[1829, 481]	2023	[1351, 2466]	2794	[2557, 2573]
482	[436, 851]	1253	[1830, 1819]	2024	[1535, 2467]	2795	[2408, 2933]
483	[320, 852]	1254	[1831, 498]	2025	[144, 2468]	2796	[1381, 731]
484	[853, 854]	1255	[203, 1832]	2026	[1741, 611]	2797	[2934, 1676]
485	[855, 856]	1256	[1833, 1588]	2027	[578, 2469]	2798	[709, 1470]
486	[5, 857]	1257	[1768, 1834]	2028	[2470, 1803]	2799	[2935, 742]
487	[858, 859]	1258	[1775, 1835]	2029	[620, 2471]	2800	[2895, 2403]
488	[860, 300]	1259	[1836, 235]	2030	[1701, 1404]	2801	[2622, 779]
489	[861, 862]	1260	[1837, 497]	2031	[1476, 1399]	2802	[2936, 2432]
490	[863, 432]	1261	[538, 1838]	2032	[2472, 1737]	2803	[2483, 1820]
491	[864, 865]	1262	[1671, 1600]	2033	[2473, 561]	2804	[1520, 1860]
492	[24, 866]	1263	[1839, 1840]	2034	[2474, 1510]	2805	[2929, 2937]
493	[867, 868]	1264	[1841, 1576]	2035	[2475, 2447]	2806	[493, 1416]
494	[90, 869]	1265	[239, 1842]	2036	[2476, 1478]	2807	[1475, 1635]
495	[870, 368]	1266	[1843, 1844]	2037	[1655, 2477]	2808	[2938, 169]
496	[871, 872]	1267	[778, 1845]	2038	[1683, 2478]	2809	[468, 2939]
497	[873, 251]	1268	[1846, 1847]	2039	[1335, 50]	2810	[795, 2929]
498	[287, 258]	1269	[1848, 1604]	2040	[233, 482]	2811	[9, 2921]
499	[874, 395]	1270	[1849, 1317]	2041	[1345, 1562]	2812	[2940, 2941]
500	[875, 829]	1271	[1850, 49]	2042	[679, 801]	2813	[155, 1686]
501	[876, 877]	1272	[1783, 775]	2043	[472, 1788]	2814	[2605, 2392]
502	[878, 822]	1273	[1851, 139]	2044	[1825, 2479]	2815	[2942, 2504]
503	[879, 880]	1274	[1852, 1853]	2045	[1347, 1677]	2816	[646, 501]
504	[881, 882]	1275	[1854, 553]	2046	[226, 2480]	2817	[1553, 1608]
505	[883, 884]	1276	[1855, 1856]	2047	[2457, 2481]	2818	[1778, 2943]
506	[429, 885]	1277	[1346, 1676]	2048	[653, 746]	2819	[2944, 729]
507	[309, 886]	1278	[1857, 795]	2049	[1373, 152]	2820	[2674, 2667]
508	[887, 888]	1279	[723, 1819]	2050	[2482, 1392]	2821	[1328, 2945]
509	[889, 890]	1280	[218, 1378]	2051	[1830, 2483]	2822	[1533, 2946]
510	[73, 891]	1281	[1853, 238]	2052	[1644, 1442]	2823	[2947, 1769]
511	[892, 893]	1282	[552, 1407]	2053	[2452, 508]	2824	[1705, 2895]
512	[894, 101]	1283	[1848, 758]	2054	[242, 2484]	2825	[12, 2948]

513	[444, 895]	1284	[144, 1858]	2055	[2485, 1855]	2826	[2949, 2394]
514	[896, 897]	1285	[1859, 1782]	2056	[619, 2476]	2827	[1354, 2532]
515	[898, 899]	1286	[1860, 127]	2057	[2486, 584]	2828	[2950, 479]
516	[900, 901]	1287	[1548, 1861]	2058	[1855, 2487]	2829	[748, 2951]
517	[902, 903]	1288	[1862, 1863]	2059	[151, 747]	2830	[1776, 138]
518	[368, 904]	1289	[1573, 1325]	2060	[485, 2488]	2831	[1332, 2941]
519	[905, 906]	1290	[127, 1864]	2061	[547, 2489]	2832	[2952, 1613]
520	[907, 908]	1291	[1865, 793]	2062	[8, 1831]	2833	[724, 1469]
521	[909, 910]	1292	[1866, 1867]	2063	[604, 2490]	2834	[2677, 2468]
522	[911, 912]	1293	[1868, 1869]	2064	[1674, 512]	2835	[2402, 2953]
523	[913, 914]	1294	[215, 1870]	2065	[609, 2491]	2836	[2954, 1696]
524	[6, 915]	1295	[1838, 1864]	2066	[2492, 468]	2837	[2955, 1724]
525	[451, 353]	1296	[59, 1813]	2067	[201, 1729]	2838	[2378, 2956]
526	[916, 917]	1297	[1663, 1517]	2068	[1867, 140]	2839	[189, 2508]
527	[301, 918]	1298	[1871, 1394]	2069	[625, 2493]	2840	[11, 491]
528	[919, 920]	1299	[685, 1872]	2070	[137, 2494]	2841	[2658, 2917]
529	[827, 921]	1300	[1372, 670]	2071	[1733, 2495]	2842	[2957, 2458]
530	[912, 290]	1301	[1330, 1873]	2072	[2404, 2496]	2843	[1639, 2958]
531	[922, 923]	1302	[1874, 592]	2073	[623, 2497]	2844	[1565, 2959]
532	[924, 262]	1303	[1875, 180]	2074	[550, 536]	2845	[2960, 2961]
533	[925, 926]	1304	[1318, 1876]	2075	[1632, 2491]	2846	[2962, 2497]
534	[927, 928]	1305	[1877, 1878]	2076	[225, 2498]	2847	[1547, 2890]
535	[929, 930]	1306	[205, 749]	2077	[1763, 1700]	2848	[1594, 2963]
536	[931, 820]	1307	[1879, 1880]	2078	[2499, 1539]	2849	[142, 2915]
537	[932, 933]	1308	[1429, 455]	2079	[639, 1401]	2850	[2492, 2423]
538	[934, 935]	1309	[465, 1881]	2080	[1465, 1609]	2851	[1786, 483]
539	[936, 937]	1310	[1882, 1632]	2081	[2500, 33]	2852	[1574, 2444]
540	[938, 939]	1311	[1443, 1646]	2082	[1601, 2501]	2853	[1631, 2602]
541	[940, 326]	1312	[1883, 1884]	2083	[1582, 2502]	2854	[197, 622]
542	[941, 942]	1313	[1885, 1886]	2084	[2503, 789]	2855	[1465, 2964]
543	[943, 944]	1314	[1148, 1887]	2085	[220, 2504]	2856	[2883, 2578]
544	[945, 946]	1315	[1888, 1889]	2086	[2505, 479]	2857	[227, 2877]
545	[115, 947]	1316	[1145, 1166]	2087	[1424, 2506]	2858	[1727, 2512]
546	[948, 823]	1317	[1890, 1891]	2088	[206, 1492]	2859	[639, 721]
547	[386, 949]	1318	[912, 1892]	2089	[1511, 2507]	2860	[2531, 2429]
548	[401, 898]	1319	[1893, 295]	2090	[2508, 467]	2861	[1568, 2965]
549	[950, 296]	1320	[1894, 1895]	2091	[1371, 2509]	2862	[2966, 2438]
550	[951, 952]	1321	[1896, 1246]	2092	[2510, 182]	2863	[2624, 1506]
551	[953, 954]	1322	[996, 22]	2093	[2511, 1393]	2864	[737, 2664]
552	[428, 955]	1323	[1897, 1898]	2094	[2512, 2513]	2865	[2967, 1493]
553	[124, 956]	1324	[1899, 1082]	2095	[2426, 1673]	2866	[2968, 594]
554	[849, 957]	1325	[315, 1900]	2096	[1322, 1475]	2867	[694, 2629]
555	[958, 959]	1326	[1901, 1159]	2097	[1379, 1329]	2868	[2969, 1452]
556	[960, 961]	1327	[1902, 1903]	2098	[1500, 2514]	2869	[53, 2970]

557	[962, 290]	1328	[1904, 1163]	2099	[1394, 1546]	2870	[2025, 2034]
558	[963, 964]	1329	[1007, 1905]	2100	[594, 1551]	2871	[1983, 443]
559	[965, 253]	1330	[320, 1010]	2101	[1455, 700]	2872	[2971, 1104]
560	[966, 967]	1331	[1906, 1907]	2102	[1418, 2515]	2873	[2972, 2973]
561	[854, 968]	1332	[936, 1908]	2103	[2516, 209]	2874	[2974, 423]
562	[969, 970]	1333	[1909, 856]	2104	[2517, 531]	2875	[2975, 1128]
563	[971, 972]	1334	[1910, 1911]	2105	[2518, 1704]	2876	[2054, 1044]
564	[973, 974]	1335	[83, 1912]	2106	[1445, 2519]	2877	[427, 351]
565	[975, 116]	1336	[30, 1913]	2107	[2520, 2462]	2878	[2261, 2288]
566	[870, 976]	1337	[1914, 1915]	2108	[2521, 557]	2879	[2295, 1206]
567	[977, 978]	1338	[1164, 1916]	2109	[2522, 2523]	2880	[855, 2976]
568	[411, 979]	1339	[355, 1280]	2110	[2452, 1640]	2881	[2250, 2977]
569	[78, 412]	1340	[1044, 1158]	2111	[1702, 1669]	2882	[2131, 398]
570	[449, 980]	1341	[806, 1917]	2112	[2524, 490]	2883	[386, 2978]
571	[981, 810]	1342	[1918, 1919]	2113	[1874, 1852]	2884	[2979, 2729]
572	[982, 983]	1343	[1017, 1920]	2114	[1392, 1719]	2885	[2763, 2203]
573	[984, 872]	1344	[321, 1921]	2115	[2525, 699]	2886	[2980, 2255]
574	[985, 986]	1345	[375, 394]	2116	[2526, 1473]	2887	[252, 2073]
575	[987, 988]	1346	[1058, 1922]	2117	[654, 2416]	2888	[445, 96]
576	[989, 990]	1347	[1923, 1030]	2118	[1451, 2527]	2889	[980, 2841]
577	[991, 992]	1348	[895, 82]	2119	[2528, 2374]	2890	[1297, 2131]
578	[380, 993]	1349	[939, 1059]	2120	[2529, 626]	2891	[2981, 2329]
579	[259, 994]	1350	[1924, 273]	2121	[2389, 2519]	2892	[2982, 2009]
580	[995, 996]	1351	[911, 962]	2122	[2530, 1566]	2893	[83, 2983]
581	[932, 997]	1352	[1925, 1290]	2123	[577, 671]	2894	[339, 2984]
582	[998, 999]	1353	[1926, 924]	2124	[2432, 506]	2895	[2251, 1170]
583	[1000, 1001]	1354	[823, 1927]	2125	[1347, 2531]	2896	[2831, 256]
584	[938, 1002]	1355	[1928, 1929]	2126	[1396, 1496]	2897	[2056, 2985]
585	[1003, 1004]	1356	[852, 1930]	2127	[1748, 1549]	2898	[2986, 317]
586	[1005, 65]	1357	[1931, 1228]	2128	[2532, 2467]	2899	[2701, 2711]
587	[1006, 1007]	1358	[1125, 1932]	2129	[455, 1740]	2900	[2987, 2702]
588	[1008, 1009]	1359	[1933, 881]	2130	[1537, 1855]	2901	[863, 2988]
589	[1010, 1011]	1360	[1934, 1935]	2131	[1813, 1471]	2902	[2989, 911]
590	[323, 1012]	1361	[1122, 1936]	2132	[1669, 2533]	2903	[2990, 2753]
591	[1013, 1014]	1362	[1937, 1938]	2133	[213, 2534]	2904	[2991, 451]
592	[402, 899]	1363	[1939, 1940]	2134	[1316, 2535]	2905	[2992, 95]
593	[807, 1015]	1364	[1941, 1002]	2135	[1866, 139]	2906	[1159, 2993]
594	[331, 1016]	1365	[1243, 1134]	2136	[2536, 1498]	2907	[17, 2994]
595	[1017, 1018]	1366	[1942, 832]	2137	[2537, 2538]	2908	[2763, 2766]
596	[1019, 1020]	1367	[1035, 1943]	2138	[2539, 2540]	2909	[2802, 840]
597	[1021, 1022]	1368	[450, 1944]	2139	[1759, 1583]	2910	[1089, 2995]
598	[1023, 1024]	1369	[1892, 433]	2140	[190, 2541]	2911	[1170, 2035]
599	[1025, 1026]	1370	[1945, 852]	2141	[1793, 1385]	2912	[2996, 951]
600	[1027, 1028]	1371	[351, 1946]	2142	[1380, 730]	2913	[2997, 2082]

601	[997, 1029]	1372	[1947, 1130]	2143	[2542, 511]	2914	[2342, 855]
602	[814, 1030]	1373	[28, 71]	2144	[784, 2543]	2915	[2998, 2001]
603	[1031, 1032]	1374	[1031, 1948]	2145	[2544, 1584]	2916	[1181, 2999]
604	[966, 404]	1375	[1949, 1939]	2146	[2393, 2545]	2917	[3000, 1923]
605	[1033, 857]	1376	[1118, 1950]	2147	[2546, 716]	2918	[3001, 2685]
606	[1034, 1035]	1377	[1951, 1900]	2148	[1809, 2382]	2919	[2268, 266]
607	[1036, 1037]	1378	[410, 409]	2149	[2547, 725]	2920	[2158, 1980]
608	[1038, 1034]	1379	[252, 947]	2150	[2503, 1707]	2921	[3002, 2020]
609	[951, 1039]	1380	[1237, 1216]	2151	[2548, 2392]	2922	[3003, 898]
610	[1040, 255]	1381	[1292, 1952]	2152	[2411, 486]	2923	[2219, 3004]
611	[1041, 452]	1382	[1311, 970]	2153	[746, 1816]	2924	[1265, 883]
612	[1042, 1043]	1383	[415, 1891]	2154	[2549, 1793]	2925	[311, 1897]
613	[1044, 1045]	1384	[1014, 1953]	2155	[1493, 1629]	2926	[2753, 2750]
614	[1046, 108]	1385	[963, 1064]	2156	[2472, 2544]	2927	[1186, 2239]
615	[1047, 81]	1386	[1954, 1262]	2157	[1497, 579]	2928	[364, 3005]
616	[1048, 1037]	1387	[1955, 1912]	2158	[2550, 1884]	2929	[2818, 2052]
617	[1049, 1050]	1388	[1956, 1957]	2159	[2551, 1744]	2930	[2239, 2767]
618	[1000, 1051]	1389	[249, 363]	2160	[1323, 2552]	2931	[1255, 3006]
619	[1052, 1053]	1390	[1958, 1959]	2161	[1746, 1504]	2932	[2101, 2854]
620	[1054, 418]	1391	[1216, 1960]	2162	[2553, 2370]	2933	[3007, 1091]
621	[1055, 1056]	1392	[1961, 124]	2163	[1799, 797]	2934	[2238, 2786]
622	[1039, 1057]	1393	[1950, 1188]	2164	[674, 609]	2935	[909, 3008]
623	[845, 1058]	1394	[1962, 1963]	2165	[2554, 148]	2936	[65, 429]
624	[1002, 1059]	1395	[308, 920]	2166	[2555, 1560]	2937	[2114, 1974]
625	[423, 1060]	1396	[74, 1964]	2167	[2556, 755]	2938	[1289, 3009]
626	[1061, 1062]	1397	[1965, 1966]	2168	[1837, 1831]	2939	[3010, 292]
627	[1063, 1064]	1398	[1967, 1238]	2169	[2557, 170]	2940	[902, 2704]
628	[1065, 1066]	1399	[95, 1075]	2170	[2558, 2559]	2941	[3011, 1934]
629	[988, 1067]	1400	[1968, 1969]	2171	[166, 1786]	2942	[1083, 1300]
630	[1068, 1069]	1401	[1939, 1970]	2172	[153, 1882]	2943	[2123, 1120]
631	[1070, 1071]	1402	[1971, 1972]	2173	[2364, 2560]	2944	[253, 3012]
632	[1072, 1073]	1403	[1973, 841]	2174	[568, 2561]	2945	[3013, 1143]
633	[28, 950]	1404	[334, 1915]	2175	[1769, 1622]	2946	[3014, 975]
634	[948, 1074]	1405	[1974, 1975]	2176	[1815, 501]	2947	[2851, 907]
635	[86, 1075]	1406	[1976, 1074]	2177	[1817, 2562]	2948	[3015, 987]
636	[1076, 821]	1407	[1977, 1978]	2178	[2563, 2564]	2949	[325, 3016]
637	[1077, 954]	1408	[955, 66]	2179	[2445, 2565]	2950	[1952, 3017]
638	[1078, 959]	1409	[264, 1979]	2180	[2414, 804]	2951	[3018, 349]
639	[1049, 1079]	1410	[1209, 1092]	2181	[2415, 2566]	2952	[2335, 3019]
640	[19, 1080]	1411	[447, 27]	2182	[2567, 2568]	2953	[3020, 2863]
641	[1081, 1082]	1412	[1980, 1920]	2183	[1802, 2569]	2954	[2809, 2972]
642	[1083, 1084]	1413	[1981, 986]	2184	[2570, 1826]	2955	[2262, 3021]
643	[1085, 1086]	1414	[1214, 1982]	2185	[537, 1785]	2956	[1026, 2203]
644	[810, 435]	1415	[1983, 917]	2186	[2571, 38]	2957	[437, 3022]

645	[1087, 1088]	1416	[1984, 1985]	2187	[1416, 2463]	2958	[3023, 2784]
646	[1089, 893]	1417	[1938, 1278]	2188	[1540, 631]	2959	[3024, 976]
647	[1090, 1091]	1418	[1986, 1987]	2189	[1597, 1348]	2960	[2224, 3025]
648	[1092, 1093]	1419	[1290, 1988]	2190	[2572, 230]	2961	[3026, 2718]
649	[1094, 1095]	1420	[399, 249]	2191	[2562, 1559]	2962	[275, 3027]
650	[1096, 264]	1421	[1989, 1990]	2192	[2573, 171]	2963	[2857, 2169]
651	[1008, 292]	1422	[1991, 1992]	2193	[228, 2574]	2964	[1982, 2031]
652	[1097, 1098]	1423	[1142, 1993]	2194	[2575, 2576]	2965	[3028, 2313]
653	[1099, 1100]	1424	[894, 1994]	2195	[1570, 2577]	2966	[879, 874]
654	[1101, 1102]	1425	[1995, 901]	2196	[131, 2470]	2967	[2972, 3029]
655	[79, 1103]	1426	[1996, 1997]	2197	[2578, 2568]	2968	[2001, 2971]
656	[1104, 1105]	1427	[1998, 1999]	2198	[1764, 1701]	2969	[309, 2855]
657	[1106, 1107]	1428	[2000, 2001]	2199	[1427, 1453]	2970	[3030, 2039]
658	[1061, 1108]	1429	[1104, 273]	2200	[2579, 14]	2971	[1765, 2961]
659	[1109, 265]	1430	[273, 2002]	2201	[2580, 1712]	2972	[590, 1490]
660	[1110, 1111]	1431	[2003, 2004]	2202	[2410, 485]	2973	[3031, 2465]
661	[1112, 1020]	1432	[2005, 2006]	2203	[2581, 2582]	2974	[1835, 3032]
662	[1113, 1114]	1433	[337, 2007]	2204	[2583, 2584]	2975	[746, 3033]
663	[1115, 1116]	1434	[994, 2008]	2205	[729, 1730]	2976	[2669, 760]
664	[1117, 1118]	1435	[2009, 1991]	2206	[2585, 790]	2977	[3034, 1485]
665	[1119, 1120]	1436	[1261, 2010]	2207	[1735, 2586]	2978	[703, 748]
666	[1121, 1122]	1437	[6, 449]	2208	[2537, 2587]	2979	[1651, 3035]
667	[1123, 1124]	1438	[336, 2011]	2209	[2549, 1548]	2980	[135, 3036]
668	[1125, 839]	1439	[2012, 887]	2210	[1557, 1537]	2981	[1785, 3037]
669	[1126, 1127]	1440	[2013, 2014]	2211	[1807, 2588]	2982	[633, 548]
670	[1128, 1129]	1441	[2015, 1205]	2212	[1740, 1431]	2983	[2674, 186]
671	[1130, 408]	1442	[2016, 2017]	2213	[2589, 1482]	2984	[1852, 1827]
672	[1131, 1132]	1443	[1101, 2018]	2214	[1592, 2399]	2985	[3038, 1458]
673	[1133, 951]	1444	[1989, 2019]	2215	[2582, 500]	2986	[1737, 1584]
674	[295, 1134]	1445	[1155, 1966]	2216	[469, 2590]	2987	[743, 3039]
675	[1135, 1124]	1446	[2020, 2021]	2217	[1668, 1530]	2988	[2489, 2532]
676	[1136, 1137]	1447	[2022, 869]	2218	[175, 2453]	2989	[1643, 2621]
677	[1138, 1139]	1448	[2023, 1174]	2219	[2591, 1552]	2990	[1537, 2671]
678	[387, 1140]	1449	[2024, 1129]	2220	[2399, 641]	2991	[1410, 647]
679	[1058, 1141]	1450	[1280, 2025]	2221	[800, 2422]	2992	[1805, 3040]
680	[1142, 1143]	1451	[405, 2026]	2222	[1585, 1448]	2993	[3041, 2905]
681	[1121, 1144]	1452	[974, 1251]	2223	[2592, 783]	2994	[758, 1571]
682	[1145, 1146]	1453	[1178, 1148]	2224	[1459, 2593]	2995	[3036, 2613]
683	[1147, 1148]	1454	[1999, 1086]	2225	[2594, 1369]	2996	[2520, 3042]
684	[1149, 1150]	1455	[1885, 1177]	2226	[2595, 765]	2997	[747, 2518]
685	[964, 1151]	1456	[2027, 974]	2227	[1824, 1372]	2998	[1723, 3043]
686	[1152, 117]	1457	[1179, 2028]	2228	[2596, 518]	2999	[3044, 165]
687	[374, 393]	1458	[2029, 311]	2229	[168, 2520]	3000	[2936, 505]
688	[1153, 1154]	1459	[1928, 2030]	2230	[1407, 2597]	3001	[2465, 224]

689	[1155, 1156]	1460	[2031, 1909]	2231	[687, 2598]	3002	[160, 3045]
690	[1157, 1158]	1461	[2032, 367]	2232	[2383, 2428]	3003	[1730, 1528]
691	[1159, 906]	1462	[1225, 2033]	2233	[565, 2390]	3004	[3046, 2567]
692	[1160, 1161]	1463	[85, 2034]	2234	[2599, 1448]	3005	[3047, 655]
693	[1162, 1163]	1464	[433, 1180]	2235	[2600, 2421]	3006	[790, 1490]
694	[1164, 1165]	1465	[1042, 2035]	2236	[1868, 2601]	3007	[805, 3047]
695	[1166, 1167]	1466	[319, 1945]	2237	[2602, 241]	3008	[1415, 2964]
696	[1168, 945]	1467	[391, 2036]	2238	[581, 205]	3009	[2555, 1482]
697	[1169, 1170]	1468	[2037, 2038]	2239	[2547, 799]	3010	[1749, 3048]
698	[1171, 1172]	1469	[1894, 2039]	2240	[2603, 2411]	3011	[1591, 2398]
699	[1173, 1174]	1470	[1210, 1093]	2241	[2604, 2584]	3012	[715, 1818]
700	[1175, 1176]	1471	[119, 2040]	2242	[607, 1660]	3013	[1596, 3049]
701	[1177, 1178]	1472	[395, 411]	2243	[2605, 469]	3014	[464, 3050]
702	[1179, 304]	1473	[1236, 966]	2244	[506, 2606]	3015	[499, 3051]
703	[291, 1180]	1474	[2041, 2020]	2245	[2607, 1592]	3016	[592, 1827]
704	[861, 354]	1475	[2042, 2043]	2246	[1404, 672]	3017	[3052, 659]
705	[1181, 1182]	1476	[2044, 2045]	2247	[2591, 199]	3018	[1564, 3053]
706	[1183, 1184]	1477	[2046, 288]	2248	[2552, 2386]	3019	[3054, 44]
707	[311, 1028]	1478	[2047, 1998]	2249	[1800, 2608]	3020	[573, 3055]
708	[990, 1185]	1479	[360, 2048]	2250	[2529, 2453]	3021	[2480, 2877]
709	[1186, 109]	1480	[2049, 880]	2251	[2609, 46]	3022	[1878, 186]
710	[1187, 29]	1481	[998, 816]	2252	[617, 2585]	3023	[2880, 3056]
711	[1188, 871]	1482	[829, 2050]	2253	[1743, 1361]	3024	[152, 673]
712	[1189, 1190]	1483	[2051, 2052]	2254	[1530, 2610]	3025	[1834, 1622]
713	[1191, 1192]	1484	[2053, 1924]	2255	[2611, 1806]	3026	[1577, 3057]
714	[1193, 1194]	1485	[2054, 1157]	2256	[532, 2612]	3027	[2964, 1382]
715	[979, 1195]	1486	[1078, 2055]	2257	[611, 2492]	3028	[174, 2529]
716	[1196, 1197]	1487	[1207, 2056]	2258	[136, 2613]	3029	[1586, 1449]
717	[1198, 1199]	1488	[1912, 2057]	2259	[2614, 2478]	3030	[718, 3058]
718	[1200, 1201]	1489	[2058, 399]	2260	[2615, 1456]	3031	[2042, 3059]
719	[355, 84]	1490	[1065, 2059]	2261	[2550, 2616]	3032	[908, 912]
720	[1202, 1203]	1491	[2060, 1259]	2262	[597, 1847]	3033	[3060, 2121]
721	[1204, 1205]	1492	[2061, 2062]	2263	[1457, 2454]	3034	[2003, 3061]
722	[1206, 1012]	1493	[1197, 261]	2264	[2571, 2617]	3035	[377, 2724]
723	[1207, 1208]	1494	[2063, 2064]	2265	[1607, 1830]	3036	[340, 3062]
724	[1209, 1210]	1495	[299, 2065]	2266	[1650, 2618]	3037	[3063, 390]
725	[1211, 371]	1496	[2066, 2067]	2267	[409, 1432]	3038	[292, 3064]
726	[1212, 1161]	1497	[1952, 2068]	2268	[1730, 681]	3039	[1144, 1936]
727	[1213, 844]	1498	[2069, 1275]	2269	[2619, 1799]	3040	[3065, 2865]
728	[1006, 1214]	1499	[2070, 999]	2270	[2567, 2620]	3041	[835, 2986]
729	[852, 1011]	1500	[2071, 968]	2271	[2413, 2621]	3042	[3009, 1988]
730	[1172, 1215]	1501	[2072, 1937]	2272	[2409, 1770]	3043	[1024, 2973]
731	[1216, 1217]	1502	[2073, 2074]	2273	[2405, 1623]	3044	[103, 3066]
732	[1218, 1219]	1503	[2069, 2075]	2274	[1534, 2622]	3045	[1223, 2731]

733	[1220, 1221]	1504	[2076, 340]	2275	[1411, 648]	3046	[1926, 2840]
734	[300, 1222]	1505	[111, 1280]	2276	[546, 1353]	3047	[2237, 2724]
735	[1035, 1223]	1506	[2077, 107]	2277	[1538, 2623]	3048	[2851, 2989]
736	[1224, 946]	1507	[295, 2078]	2278	[1340, 2624]	3049	[2983, 2057]
737	[1225, 1226]	1508	[2079, 865]	2279	[2625, 218]	3050	[954, 2989]
738	[451, 861]	1509	[1033, 6]	2280	[2626, 708]	3051	[3067, 2714]
739	[1227, 1228]	1510	[2080, 2081]	2281	[2542, 2627]	3052	[2730, 2749]
740	[1229, 890]	1511	[1171, 2082]	2282	[2628, 179]	3053	[3068, 2100]
741	[1230, 1231]	1512	[2083, 1130]	2283	[2629, 1761]	3054	[2216, 2262]
742	[1232, 322]	1513	[2084, 1126]	2284	[218, 2630]	3055	[3069, 1132]
743	[1233, 1234]	1514	[1899, 2085]	2285	[1677, 2631]	3056	[1970, 2797]
744	[1235, 387]	1515	[2086, 1067]	2286	[1881, 1531]	3057	[3070, 2190]
745	[27, 383]	1516	[2087, 2088]	2287	[1819, 2632]	3058	[2984, 3062]
746	[1098, 1236]	1517	[1064, 1151]	2288	[2558, 2576]	3059	[3071, 2476]
747	[1237, 1238]	1518	[2089, 1945]	2289	[1665, 702]	3060	[234, 3072]
748	[304, 1239]	1519	[1070, 2090]	2290	[1430, 1839]	3061	[3073, 2651]
749	[997, 1240]	1520	[398, 248]	2291	[2633, 768]	3062	[3074, 170]
750	[999, 413]	1521	[1219, 1152]	2292	[1706, 1628]	3063	[1542, 2517]
751	[1241, 1242]	1522	[2091, 2092]	2293	[2436, 1337]	3064	[3048, 1796]
752	[294, 1243]	1523	[1174, 1146]	2294	[2634, 161]	3065	[1601, 3075]
753	[1244, 370]	1524	[1131, 2093]	2295	[1604, 1571]	3066	[1666, 241]
754	[1090, 1245]	1525	[2094, 2095]	2296	[741, 2635]	3067	[2580, 629]
755	[1199, 1246]	1526	[2096, 1963]	2297	[2636, 1411]	3068	[782, 1800]
756	[1247, 1248]	1527	[987, 2086]	2298	[503, 2637]	3069	[1486, 2885]
757	[1128, 1249]	1528	[1011, 2097]	2299	[2583, 2638]	3070	[497, 3076]
758	[1250, 1251]	1529	[2098, 2099]	2300	[2639, 1721]	3071	[1178, 2742]
759	[390, 1252]	1530	[1986, 2100]	2301	[560, 2640]	3072	[3077, 282]
760	[1253, 1254]	1531	[2101, 341]	2302	[2641, 1749]	3073	[2712, 3078]
761	[1255, 1256]	1532	[2102, 2103]	2303	[2642, 1842]	3074	[402, 2691]
762	[1257, 937]	1533	[390, 2104]	2304	[1338, 2639]	3075	[1028, 1898]
763	[981, 434]	1534	[1172, 2105]	2305	[2643, 696]	3076	[3079, 2741]
764	[1258, 1259]	1535	[924, 815]	2306	[1389, 2485]	3077	[1700, 2409]
765	[1260, 265]	1536	[2106, 1990]	2307	[1374, 153]	3078	[1744, 1433]
766	[1261, 1262]	1537	[426, 2107]	2308	[2644, 466]	3079	[1641, 3080]
767	[1263, 1264]	1538	[1187, 2108]	2309	[2581, 499]	3080	[3081, 1985]
768	[1265, 1266]	1539	[2109, 1288]	2310	[2645, 1754]	3081	[1881, 1421]
769	[1067, 257]	1540	[2110, 1072]	2311	[1445, 2646]		
770	[1267, 1268]	1541	[1118, 283]	2312	[2602, 1875]		

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	514	1	1028	1	1542	0	2056	1	2570	0
1	0	515	1	1029	0	1543	1	2057	0	2571	1
2	0	516	1	1030	0	1544	1	2058	1	2572	1

3	0	517	1	1031	1	1545	0	2059	1	2573	1
4	0	518	0	1032	1	1546	1	2060	0	2574	1
5	0	519	0	1033	1	1547	0	2061	1	2575	0
6	0	520	0	1034	1	1548	1	2062	1	2576	1
7	0	521	0	1035	1	1549	1	2063	0	2577	0
8	1	522	1	1036	1	1550	1	2064	0	2578	1
9	0	523	1	1037	1	1551	0	2065	1	2579	1
10	0	524	0	1038	0	1552	0	2066	0	2580	1
11	0	525	1	1039	0	1553	1	2067	1	2581	0
12	1	526	1	1040	0	1554	1	2068	0	2582	0
13	0	527	0	1041	0	1555	0	2069	0	2583	0
14	0	528	0	1042	1	1556	1	2070	1	2584	1
15	0	529	1	1043	0	1557	0	2071	0	2585	0
16	1	530	1	1044	1	1558	1	2072	1	2586	0
17	1	531	1	1045	1	1559	1	2073	1	2587	0
18	0	532	1	1046	0	1560	1	2074	1	2588	0
19	0	533	1	1047	1	1561	0	2075	0	2589	1
20	1	534	1	1048	0	1562	1	2076	0	2590	1
21	0	535	0	1049	1	1563	1	2077	0	2591	1
22	0	536	0	1050	0	1564	1	2078	0	2592	0
23	0	537	0	1051	1	1565	1	2079	1	2593	0
24	0	538	1	1052	1	1566	1	2080	1	2594	0
25	1	539	0	1053	1	1567	0	2081	0	2595	0
26	1	540	1	1054	1	1568	0	2082	0	2596	0
27	0	541	1	1055	0	1569	1	2083	1	2597	0
28	0	542	1	1056	0	1570	0	2084	0	2598	1
29	0	543	1	1057	1	1571	0	2085	0	2599	1
30	0	544	1	1058	1	1572	0	2086	0	2600	1
31	0	545	0	1059	1	1573	0	2087	0	2601	1
32	0	546	0	1060	1	1574	0	2088	1	2602	0
33	1	547	1	1061	0	1575	0	2089	1	2603	0
34	1	548	1	1062	0	1576	1	2090	1	2604	1
35	1	549	0	1063	0	1577	1	2091	0	2605	0
36	1	550	1	1064	1	1578	1	2092	0	2606	0
37	0	551	1	1065	1	1579	0	2093	1	2607	1
38	0	552	0	1066	0	1580	1	2094	1	2608	1
39	0	553	1	1067	0	1581	0	2095	1	2609	1
40	1	554	0	1068	0	1582	1	2096	1	2610	0
41	1	555	0	1069	1	1583	1	2097	1	2611	0
42	0	556	0	1070	0	1584	1	2098	0	2612	1
43	0	557	0	1071	0	1585	0	2099	0	2613	0
44	1	558	1	1072	0	1586	0	2100	1	2614	0
45	0	559	0	1073	0	1587	0	2101	0	2615	1
46	0	560	0	1074	0	1588	1	2102	0	2616	0

47	0	561	1	1075	0	1589	1	2103	1	2617	1
48	0	562	0	1076	0	1590	1	2104	0	2618	1
49	0	563	0	1077	0	1591	0	2105	1	2619	0
50	1	564	0	1078	1	1592	1	2106	0	2620	0
51	1	565	0	1079	1	1593	0	2107	1	2621	1
52	1	566	1	1080	0	1594	1	2108	1	2622	1
53	1	567	1	1081	0	1595	0	2109	0	2623	1
54	1	568	1	1082	1	1596	0	2110	0	2624	0
55	0	569	0	1083	1	1597	1	2111	1	2625	1
56	0	570	0	1084	1	1598	1	2112	0	2626	0
57	0	571	0	1085	0	1599	1	2113	1	2627	1
58	0	572	0	1086	1	1600	0	2114	1	2628	1
59	0	573	0	1087	0	1601	0	2115	0	2629	1
60	0	574	1	1088	1	1602	1	2116	0	2630	0
61	0	575	1	1089	1	1603	1	2117	1	2631	1
62	0	576	0	1090	0	1604	0	2118	0	2632	0
63	0	577	1	1091	1	1605	0	2119	0	2633	1
64	1	578	1	1092	1	1606	1	2120	1	2634	0
65	0	579	1	1093	1	1607	0	2121	1	2635	1
66	1	580	0	1094	1	1608	0	2122	0	2636	1
67	1	581	0	1095	1	1609	1	2123	1	2637	1
68	1	582	0	1096	0	1610	1	2124	0	2638	0
69	1	583	1	1097	0	1611	0	2125	0	2639	0
70	1	584	1	1098	1	1612	1	2126	0	2640	0
71	1	585	0	1099	1	1613	1	2127	1	2641	0
72	1	586	1	1100	0	1614	0	2128	0	2642	0
73	1	587	0	1101	1	1615	0	2129	1	2643	0
74	0	588	1	1102	1	1616	1	2130	0	2644	0
75	0	589	1	1103	1	1617	1	2131	1	2645	0
76	0	590	1	1104	0	1618	1	2132	1	2646	1
77	0	591	0	1105	0	1619	1	2133	1	2647	0
78	0	592	0	1106	1	1620	0	2134	1	2648	0
79	0	593	1	1107	1	1621	1	2135	0	2649	1
80	0	594	1	1108	1	1622	1	2136	0	2650	0
81	1	595	1	1109	1	1623	1	2137	0	2651	0
82	0	596	0	1110	0	1624	1	2138	0	2652	1
83	1	597	0	1111	1	1625	1	2139	1	2653	1
84	0	598	0	1112	1	1626	1	2140	0	2654	1
85	1	599	1	1113	0	1627	0	2141	0	2655	1
86	0	600	1	1114	1	1628	0	2142	0	2656	0
87	1	601	0	1115	1	1629	1	2143	0	2657	1
88	1	602	1	1116	1	1630	0	2144	0	2658	1
89	1	603	1	1117	1	1631	1	2145	1	2659	1
90	0	604	0	1118	1	1632	0	2146	1	2660	0

91	0	605	1	1119	0	1633	1	2147	1	2661	0
92	0	606	1	1120	0	1634	0	2148	1	2662	1
93	0	607	1	1121	1	1635	0	2149	1	2663	0
94	0	608	0	1122	1	1636	0	2150	0	2664	0
95	1	609	1	1123	0	1637	1	2151	1	2665	0
96	0	610	0	1124	1	1638	0	2152	1	2666	0
97	1	611	0	1125	0	1639	0	2153	1	2667	1
98	0	612	1	1126	0	1640	0	2154	1	2668	0
99	1	613	1	1127	1	1641	0	2155	1	2669	1
100	1	614	0	1128	0	1642	0	2156	1	2670	0
101	1	615	1	1129	0	1643	1	2157	1	2671	0
102	1	616	0	1130	0	1644	0	2158	1	2672	0
103	0	617	1	1131	0	1645	1	2159	0	2673	1
104	1	618	1	1132	0	1646	0	2160	0	2674	1
105	0	619	1	1133	0	1647	0	2161	1	2675	0
106	1	620	1	1134	1	1648	0	2162	0	2676	1
107	0	621	0	1135	1	1649	1	2163	0	2677	1
108	1	622	0	1136	0	1650	1	2164	1	2678	1
109	0	623	1	1137	0	1651	0	2165	1	2679	1
110	0	624	1	1138	0	1652	0	2166	0	2680	1
111	0	625	0	1139	0	1653	1	2167	1	2681	1
112	0	626	0	1140	0	1654	0	2168	0	2682	1
113	0	627	0	1141	1	1655	1	2169	1	2683	1
114	0	628	1	1142	1	1656	0	2170	1	2684	0
115	0	629	1	1143	0	1657	1	2171	0	2685	0
116	0	630	0	1144	0	1658	0	2172	1	2686	0
117	0	631	0	1145	1	1659	1	2173	0	2687	0
118	0	632	0	1146	1	1660	1	2174	1	2688	1
119	0	633	0	1147	1	1661	1	2175	0	2689	0
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123	0	637	0	1151	0	1665	1	2179	1	2693	1
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125	0	639	1	1153	0	1667	0	2181	1	2695	0
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132	0	646	1	1160	1	1674	0	2188	0	2702	1
133	1	647	0	1161	0	1675	1	2189	1	2703	1
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139	1	653	1	1167	1	1681	1	2195	0	2709	1
140	1	654	1	1168	1	1682	1	2196	1	2710	0
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145	1	659	1	1173	0	1687	1	2201	1	2715	0
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147	0	661	1	1175	0	1689	0	2203	0	2717	1
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149	1	663	1	1177	1	1691	0	2205	0	2719	1
150	0	664	1	1178	0	1692	1	2206	0	2720	1
151	1	665	0	1179	0	1693	1	2207	0	2721	0
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156	0	670	0	1184	1	1698	1	2212	0	2726	1
157	1	671	0	1185	1	1699	1	2213	1	2727	0
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159	0	673	0	1187	1	1701	1	2215	0	2729	0
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169	0	683	1	1197	1	1711	0	2225	0	2739	0
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171	1	685	0	1199	0	1713	1	2227	0	2741	0
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185	0	699	0	1213	0	1727	0	2241	1	2755	0
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194	0	708	1	1222	0	1736	0	2250	1	2764	0
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201	1	715	1	1229	0	1743	1	2257	0	2771	1
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206	1	720	1	1234	1	1748	1	2262	0	2776	0
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208	1	722	0	1236	0	1750	0	2264	1	2778	0
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214	1	728	0	1242	1	1756	0	2270	0	2784	0
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216	1	730	1	1244	1	1758	0	2272	0	2786	1
217	0	731	1	1245	0	1759	1	2273	0	2787	1
218	1	732	0	1246	1	1760	1	2274	1	2788	0
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225	0	739	1	1253	1	1767	1	2281	0	2795	1
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228	0	742	0	1256	1	1770	0	2284	1	2798	0
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237	1	751	1	1265	1	1779	0	2293	0	2807	1
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291	1	805	1	1319	1	1833	1	2347	1	2861	0
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293	1	807	1	1321	1	1835	1	2349	1	2863	0
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295	1	809	1	1323	0	1837	0	2351	0	2865	1
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379	1	893	1	1407	0	1921	1	2435	1	2949	0
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396	0	910	1	1424	0	1938	0	2452	0	2966	1
397	1	911	1	1425	0	1939	1	2453	1	2967	1
398	0	912	1	1426	1	1940	1	2454	0	2968	0

399	0	913	1	1427	0	1941	0	2455	1	2969	1
400	0	914	1	1428	0	1942	1	2456	1	2970	0
401	1	915	1	1429	0	1943	0	2457	1	2971	1
402	0	916	1	1430	1	1944	0	2458	0	2972	1
403	1	917	0	1431	1	1945	0	2459	1	2973	1
404	0	918	1	1432	1	1946	1	2460	1	2974	1
405	0	919	0	1433	1	1947	0	2461	1	2975	1
406	1	920	0	1434	0	1948	0	2462	1	2976	1
407	1	921	1	1435	1	1949	1	2463	1	2977	1
408	1	922	1	1436	1	1950	0	2464	0	2978	1
409	0	923	0	1437	0	1951	0	2465	1	2979	0
410	1	924	1	1438	1	1952	1	2466	0	2980	1
411	1	925	1	1439	1	1953	1	2467	1	2981	0
412	0	926	0	1440	0	1954	0	2468	0	2982	0
413	0	927	1	1441	1	1955	0	2469	0	2983	1
414	0	928	1	1442	0	1956	0	2470	1	2984	1
415	0	929	0	1443	1	1957	1	2471	0	2985	1
416	1	930	0	1444	1	1958	1	2472	1	2986	0
417	0	931	0	1445	0	1959	1	2473	1	2987	0
418	0	932	0	1446	1	1960	0	2474	0	2988	0
419	0	933	1	1447	1	1961	1	2475	1	2989	1
420	0	934	1	1448	1	1962	0	2476	0	2990	0
421	0	935	0	1449	1	1963	1	2477	1	2991	0
422	0	936	0	1450	1	1964	0	2478	1	2992	1
423	0	937	1	1451	0	1965	1	2479	0	2993	1
424	0	938	1	1452	0	1966	0	2480	1	2994	1
425	0	939	0	1453	0	1967	1	2481	1	2995	0
426	0	940	1	1454	1	1968	1	2482	0	2996	1
427	0	941	1	1455	0	1969	1	2483	1	2997	0
428	0	942	1	1456	1	1970	0	2484	1	2998	1
429	0	943	1	1457	0	1971	1	2485	1	2999	0
430	0	944	0	1458	1	1972	1	2486	0	3000	0
431	0	945	1	1459	0	1973	0	2487	1	3001	1
432	1	946	1	1460	1	1974	0	2488	1	3002	1
433	0	947	0	1461	1	1975	1	2489	0	3003	0
434	0	948	0	1462	1	1976	1	2490	1	3004	0
435	1	949	0	1463	1	1977	0	2491	1	3005	0
436	1	950	0	1464	0	1978	1	2492	0	3006	0
437	0	951	1	1465	1	1979	0	2493	0	3007	1
438	1	952	1	1466	0	1980	0	2494	0	3008	0
439	1	953	1	1467	0	1981	0	2495	0	3009	0
440	1	954	1	1468	1	1982	0	2496	0	3010	0
441	1	955	1	1469	1	1983	0	2497	0	3011	0
442	0	956	0	1470	0	1984	1	2498	1	3012	1

443	1	957	1	1471	0	1985	0	2499	0	3013	0
444	0	958	0	1472	1	1986	0	2500	0	3014	1
445	0	959	0	1473	0	1987	0	2501	0	3015	1
446	1	960	0	1474	0	1988	1	2502	1	3016	0
447	1	961	0	1475	1	1989	1	2503	0	3017	1
448	0	962	0	1476	1	1990	1	2504	1	3018	1
449	0	963	1	1477	0	1991	0	2505	0	3019	1
450	1	964	0	1478	1	1992	1	2506	1	3020	0
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454	0	968	1	1482	0	1996	1	2510	0	3024	0
455	1	969	0	1483	1	1997	1	2511	1	3025	1
456	1	970	1	1484	0	1998	0	2512	1	3026	1
457	1	971	0	1485	1	1999	1	2513	1	3027	0
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460	0	974	0	1488	0	2002	0	2516	1	3030	0
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465	1	979	1	1493	1	2007	1	2521	1	3035	1
466	1	980	1	1494	0	2008	0	2522	0	3036	0
467	1	981	0	1495	1	2009	1	2523	0	3037	0
468	1	982	0	1496	0	2010	1	2524	0	3038	1
469	1	983	0	1497	1	2011	0	2525	0	3039	0
470	0	984	0	1498	0	2012	1	2526	0	3040	0
471	1	985	1	1499	1	2013	0	2527	1	3041	1
472	1	986	0	1500	0	2014	1	2528	0	3042	0
473	0	987	1	1501	1	2015	1	2529	1	3043	0
474	1	988	1	1502	1	2016	0	2530	0	3044	0
475	1	989	0	1503	0	2017	0	2531	1	3045	1
476	0	990	1	1504	0	2018	0	2532	0	3046	0
477	1	991	1	1505	0	2019	0	2533	0	3047	0
478	0	992	1	1506	0	2020	1	2534	0	3048	0
479	0	993	0	1507	1	2021	0	2535	0	3049	1
480	0	994	0	1508	1	2022	1	2536	0	3050	1
481	1	995	0	1509	1	2023	1	2537	0	3051	1
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484	0	998	0	1512	1	2026	0	2540	1	3054	1
485	0	999	0	1513	0	2027	1	2541	1	3055	1
486	0	1000	1	1514	1	2028	1	2542	0	3056	0

487	0	1001	0	1515	0	2029	1	2543	1	3057	0
488	0	1002	1	1516	0	2030	1	2544	1	3058	1
489	1	1003	0	1517	1	2031	1	2545	1	3059	0
490	1	1004	1	1518	1	2032	1	2546	1	3060	0
491	0	1005	1	1519	0	2033	1	2547	1	3061	0
492	0	1006	0	1520	0	2034	0	2548	1	3062	0
493	1	1007	1	1521	1	2035	1	2549	1	3063	0
494	0	1008	1	1522	0	2036	0	2550	1	3064	0
495	1	1009	0	1523	0	2037	1	2551	0	3065	0
496	1	1010	1	1524	0	2038	1	2552	1	3066	1
497	0	1011	0	1525	1	2039	1	2553	0	3067	1
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501	0	1015	0	1529	0	2043	1	2557	1	3071	0
502	0	1016	1	1530	0	2044	1	2558	1	3072	0
503	1	1017	1	1531	0	2045	0	2559	0	3073	0
504	0	1018	1	1532	0	2046	0	2560	0	3074	0
505	1	1019	0	1533	0	2047	1	2561	1	3075	1
506	0	1020	0	1534	1	2048	1	2562	1	3076	0
507	1	1021	0	1535	1	2049	0	2563	1	3077	0
508	1	1022	1	1536	0	2050	0	2564	0	3078	0
509	1	1023	0	1537	0	2051	1	2565	1	3079	0
510	1	1024	0	1538	1	2052	0	2566	0	3080	0
511	0	1025	1	1539	0	2053	0	2567	0	3081	0
512	0	1026	0	1540	0	2054	1	2568	1		
513	0	1027	1	1541	1	2055	1	2569	0		

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