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

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

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

$$\begin{aligned}
p_0(z)&=z^{18}+z^{15}+z^{14}+z^{13}+z^{12}+z^{10}+z^9+z^6+z^4+z+1,\\
p_1(z)&=z^{18}+z^{15}+z^{14}+z^{13}+z^{12}+z^{10}+z^9+z^4+z^2+z,\\
p_2(z)&=z^{24}+z^8+z^6+z^2,\\
p_3(z)&=z^{18}+z^{15}+z^{14}+z^{13}+z^{12}+z^{10}+z^9+z^4+z^2+z,\\
p_4(z)&=z^{18}+z^{15}+z^{14}+z^{13}+z^{10}+z^9+z^2+z,
\end{aligned}$$

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

$$\begin{aligned}
p_0(z)&=z^{18}+z^{15}+z^{14}+z^{13}+z^{12}+z^{10}+z^9+z^6+z^4+z,\\
p_1(z)&=z^{18}+z^{15}+z^{14}+z^{13}+z^{12}+z^{10}+z^9+z^4+z^2+z,\\
p_2(z)&=z^{24}+z^8+z^6+z^2,\\
p_3(z)&=z^{18}+z^{15}+z^{14}+z^{13}+z^{12}+z^{10}+z^9+z^4+z^2+z,\\
p_4(z)&=z^{18}+z^{15}+z^{14}+z^{13}+z^{10}+z^9+z^2+z+1.
\end{aligned}$$

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

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

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

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

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

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

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

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

for some positive integer d_n. Hence,

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

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

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

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

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

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 $a_0, a_1, \dots, a_{n-1} \in \mathbb{F}_2$ $P(x, \sum_{j=0}^{n-1} a_j x^j) = O(x^n)$ 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 32 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

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

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

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

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

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

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

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 $u = 2^{2k}$,

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

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

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

which can be rewritten as

$$0 = T[[1w]_2] + T[[10w]_2] + T[[11w]_2] + T[[110w]_2], \tag{2.7}$$

$$0 = T[[10w]_2] + T[[11w]_2] + T[[100w]_2] + T[[111w]_2], \tag{2.8}$$

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

$$0 = T[[1w]_2] + T[[10w]_2] + T[[11w]_2] + T[[100w]_2] + T[[101w]_2] + T[[1001w]_2], \tag{2.10}$$

$$0 = T[[1w]_2] + T[[100w]_2] + T[[101w]_2] + T[[1010w]_2], \tag{2.11}$$

$$0 = T[[1w]_2] + T[[11w]_2] + T[[101w]_2] + T[[1011w]_2], \tag{2.12}$$

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

$$0 = T[[1w]_2] + T[[10w]_2] + T[[11w]_2] + T[[110w]_2], \tag{2.13}$$

$$0 = T[[10w]_2] + T[[11w]_2] + T[[100w]_2] + T[[111w]_2], \tag{2.14}$$

$$0 = T[[11w]_2] + T[[100w]_2] + T[[101w]_2] + T[[1000w]_2], \tag{2.15}$$

$$0 = T[[1w]_2] + T[[10w]_2] + T[[11w]_2] + T[[100w]_2] + T[[101w]_2] + T[[1001w]_2], \tag{2.16}$$

$$0 = T[[1w]_2] + T[[100w]_2] + T[[101w]_2] + T[[1010w]_2], \tag{2.17}$$

$$0 = T[[1w]_2] + T[[11w]_2] + T[[101w]_2] + T[[1011w]_2], \tag{2.18}$$

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

First we calculate an 2-automaton that generates T from its minimal polynomial and its first terms. This automaton has 2810 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

$$0 = \tau(A(s, 1)) + \tau(A(s, 10)) + \tau(A(s, 11)) + \tau(A(s, 110)), \tag{2.19}$$

$$0 = \tau(A(s, 10)) + \tau(A(s, 11)) + \tau(A(s, 100)) + \tau(A(s, 111)), \tag{2.20}$$

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

$$0 = \tau(A(s, 1)) + \tau(A(s, 10)) + \tau(A(s, 11)) + \tau(A(s, 100)) + \tau(A(s, 101)) + \tau(A(s, 1001)), \tag{2.22}$$

$$0 = \tau(A(s, 1)) + \tau(A(s, 100)) + \tau(A(s, 101)) + \tau(A(s, 1010)), \tag{2.23}$$

$$0 = \tau(A(s, 1)) + \tau(A(s, 11)) + \tau(A(s, 101)) + \tau(A(s, 1011)), \tag{2.24}$$

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

$$0 = \tau(A(s, 1)) + \tau(A(s, 10)) + \tau(A(s, 11)) + \tau(A(s, 110)), \tag{2.25}$$

$$0 = \tau(A(s, 10)) + \tau(A(s, 11)) + \tau(A(s, 100)) + \tau(A(s, 111)), \tag{2.26}$$

$$0 = \tau(A(s, 11)) + \tau(A(s, 100)) + \tau(A(s, 101)) + \tau(A(s, 1000)), \tag{2.27}$$

$$0 = \tau(A(s, 1)) + \tau(A(s, 10)) + \tau(A(s, 11)) + \tau(A(s, 100)) + \tau(A(s, 101)) + \tau(A(s, 1001)), \tag{2.28}$$

$$0 = \tau(A(s, 1)) + \tau(A(s, 100)) + \tau(A(s, 101)) + \tau(A(s, 1010)), \tag{2.29}$$

$$0 = \tau(A(s, 1)) + \tau(A(s, 11)) + \tau(A(s, 101)) + \tau(A(s, 1011)), \tag{2.30}$$

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 $2 \leq k \leq 13$, which turns out to be true. $\square$

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

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

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

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

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

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 $n \geq 2$, we claim that

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

We give the proof of

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

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

$$\begin{aligned} W_{2k}M_{2k} = \big(&W^e[:6v] + x^{3v}W^e[:3v] + x^{4v}W^e[:2v] + x^{5v}W^e[:v] + x^{6u}R^e\big) \times \big(\\ &M^e[:6v] + x^{3v}M^e[:3v] + x^{4v}M^e[:2v] + x^{5v}M^e[:v] + x^{6u}R^e\big); \end{aligned} \tag{2.31}$$

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

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

For all $n \leq 12$, 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

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

Using the notation introduced above, we can represent the expressions lhs (2.31) 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 $0 \le j,k \le 1$,

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

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

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

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

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

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

Define

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

where

$$q_0(x) = x^{24} + x^{23} + x^{20} + x^{18} + x^{15} + x^{14} + x^{12} + x^{11} + x^{10} + x^9 + x^6,$$
$$q_1(x) = x^{23} + x^{22} + x^{20} + x^{15} + x^{14} + x^{12} + x^{11} + x^{10} + x^9 + x^6,$$
$$q_2(x) = x^{22} + x^{18} + x^{16} + 1,$$
$$q_3(x) = x^{23} + x^{22} + x^{20} + x^{15} + x^{14} + x^{12} + x^{11} + x^{10} + x^9 + x^6,$$
$$q_4(x) = x^{23} + x^{22} + x^{15} + x^{14} + x^{11} + x^{10} + x^9 + x^6.$$

The polynomial $Q(x,y)$ is the candidate for the minimal polynomial of $f(x)$ found by Padé-Hermite approximation. To prove that it is indeed the minimal polynomial of $f(x)$, we only need to prove that it is an irreducible factor of $P(x,y)$ of multiplicity m and $R(x,y) := P(x,y)/Q(x,y)^m$ is not an annihilating polynomial of $f(x)$. We verify the first point directly. For the second point, we find that when we truncate $f(x)$ to order 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 32 initial terms to determine the solutions uniquely are given below.

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

$$\begin{aligned} p_0(x) = {} & x^{126} + x^{124} + x^{118} + x^{116} + x^{102} + x^{100} + x^{98} + x^{92} + x^{90} + x^{84} \\ & + x^{82} + x^{76} + x^{74} + x^{68} + x^{66} + x^{64} + x^{58} + x^{56} + x^{50} + x^{44} + x^{42} \\ & + x^{40} + x^{36}, \end{aligned}$$

$$
\begin{aligned}
p_3(x) &= x^{122} + x^{118} + x^{112} + x^{110} + x^{104} + x^{100} + x^{90} + x^{88} + x^{86} + x^{84}\\
&\quad + x^{78} + x^{74} + x^{72} + x^{70} + x^{68} + x^{66} + x^{64} + x^{56} + x^{54} + x^{44} + x^{40}\\
&\quad + x^{36} + x^{28} + x^{24},\\
p_6(x) &= x^{120} + x^{118} + x^{116} + x^{114} + x^{110} + x^{100} + x^{98} + x^{96} + x^{92} + x^{86}\\
&\quad + x^{84} + x^{82} + x^{78} + x^{72} + x^{70} + x^{68} + x^{64} + x^{60} + x^{58} + x^{54} + x^{52}\\
&\quad + x^{50} + x^{48} + x^{42} + x^{28} + x^{24} + x^{20} + x^{16} + x^{4} + 1,\\
p_9(x) &= x^{124} + x^{122} + x^{120} + x^{118} + x^{112} + x^{108} + x^{106} + x^{104} + x^{102} + x^{94}\\
&\quad + x^{92} + x^{90} + x^{84} + x^{76} + x^{74} + x^{68} + x^{66} + x^{64} + x^{58} + x^{52} + x^{50}\\
&\quad + x^{48} + x^{42} + x^{30} + x^{26} + x^{24} + x^{20} + x^{18} + x^{16} + x^{12},\\
p_{12}(x) &= x^{124} + x^{120} + x^{116} + x^{112} + x^{108} + x^{104} + x^{92} + x^{88} + x^{76} + x^{72}\\
&\quad + x^{52} + x^{48} + x^{28} + x^{24} + x^{20} + x^{16} + x^{4} + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{126} + x^{125} + x^{123} + x^{121} + x^{120} + x^{118} + x^{116} + x^{115} + x^{114} + x^{111}\\
&\quad + x^{110} + x^{109} + x^{107} + x^{106} + x^{103} + x^{102} + x^{101} + x^{100} + x^{98} + x^{97}\\
&\quad + x^{95} + x^{93} + x^{92} + x^{91} + x^{90} + x^{89} + x^{87} + x^{85} + x^{84} + x^{81} + x^{78}\\
&\quad + x^{77} + x^{76} + x^{75} + x^{69} + x^{68} + x^{67} + x^{64} + x^{61} + x^{57} + x^{56} + x^{55}\\
&\quad + x^{51} + x^{45} + x^{44} + x^{41} + x^{40} + x^{39} + x^{36},\\
p_3(x) &= x^{124} + x^{120} + x^{118} + x^{116} + x^{112} + x^{110} + x^{108} + x^{104} + x^{100} + x^{96}\\
&\quad + x^{86} + x^{78} + x^{76} + x^{72} + x^{70} + x^{54},\\
p_6(x) &= x^{123} + x^{122} + x^{120} + x^{119} + x^{118} + x^{117} + x^{114} + x^{111} + x^{110} + x^{109}\\
&\quad + x^{107} + x^{104} + x^{99} + x^{98} + x^{96} + x^{93} + x^{92} + x^{90} + x^{89} + x^{88} + x^{86}\\
&\quad + x^{83} + x^{82} + x^{81} + x^{78} + x^{75} + x^{74} + x^{73} + x^{70} + x^{67} + x^{66} + x^{65}\\
&\quad + x^{63} + x^{60} + x^{59} + x^{58} + x^{56} + x^{55} + x^{54} + x^{53} + x^{50} + x^{45} + x^{44}\\
&\quad + x^{42} + x^{41} + x^{40} + x^{39} + x^{36},\\
p_9(x) &= x^{122} + x^{120} + x^{118} + x^{116} + x^{108} + x^{106} + x^{104} + x^{102} + x^{100} + x^{96}\\
&\quad + x^{94} + x^{92} + x^{90} + x^{80} + x^{76} + x^{74} + x^{66} + x^{60} + x^{58} + x^{52} + x^{50}\\
&\quad + x^{48} + x^{42} + x^{30} + x^{28} + x^{26} + x^{24} + x^{18},\\
p_{12}(x) &= x^{121} + x^{120} + x^{119} + x^{117} + x^{115} + x^{113} + x^{111} + x^{108} + x^{105} + x^{104}\\
&\quad + x^{103} + x^{100} + x^{97} + x^{96} + x^{95} + x^{92} + x^{89} + x^{88} + x^{87} + x^{84} + x^{81}\\
&\quad + x^{80} + x^{79} + x^{76} + x^{73} + x^{72} + x^{71} + x^{68} + x^{65} + x^{64} + x^{63} + x^{60}\\
&\quad + x^{53} + x^{52} + x^{51} + x^{48} + x^{25} + x^{24} + x^{23} + x^{21} + x^{19} + x^{17} + x^{15}\\
&\quad + x^{12} + x^{5} + x^{4} + x^{3} + 1,
\end{aligned}
$$

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

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

$$\begin{aligned}
p_0(x) &= x^{126} + x^{125} + x^{123} + x^{121} + x^{120} + x^{118} + x^{116} + x^{115} + x^{114} + x^{111} \\
&\quad + x^{110} + x^{109} + x^{107} + x^{106} + x^{103} + x^{102} + x^{101} + x^{100} + x^{98} + x^{97} \\
&\quad + x^{95} + x^{93} + x^{92} + x^{91} + x^{90} + x^{89} + x^{87} + x^{85} + x^{84} + x^{81} + x^{78} \\
&\quad + x^{77} + x^{76} + x^{75} + x^{69} + x^{68} + x^{67} + x^{64} + x^{61} + x^{57} + x^{56} + x^{55} \\
&\quad + x^{51} + x^{45} + x^{44} + x^{41} + x^{40} + x^{39} + x^{36}, \\
p_3(x) &= x^{124} + x^{120} + x^{118} + x^{116} + x^{112} + x^{110} + x^{108} + x^{104} + x^{100} + x^{96} \\
&\quad + x^{86} + x^{78} + x^{76} + x^{72} + x^{70} + x^{54}, \\
p_6(x) &= x^{123} + x^{122} + x^{120} + x^{119} + x^{118} + x^{117} + x^{114} + x^{111} + x^{110} + x^{109} \\
&\quad + x^{107} + x^{104} + x^{99} + x^{98} + x^{96} + x^{93} + x^{92} + x^{90} + x^{89} + x^{88} + x^{86} \\
&\quad + x^{83} + x^{82} + x^{81} + x^{78} + x^{75} + x^{74} + x^{73} + x^{70} + x^{67} + x^{66} + x^{65} \\
&\quad + x^{63} + x^{60} + x^{59} + x^{58} + x^{56} + x^{55} + x^{54} + x^{53} + x^{50} + x^{45} + x^{44} \\
&\quad + x^{42} + x^{41} + x^{40} + x^{39} + x^{36}, \\
p_9(x) &= x^{122} + x^{120} + x^{118} + x^{116} + x^{108} + x^{106} + x^{104} + x^{102} + x^{100} + x^{96} \\
&\quad + x^{94} + x^{92} + x^{90} + x^{80} + x^{76} + x^{74} + x^{66} + x^{60} + x^{58} + x^{52} + x^{50} \\
&\quad + x^{48} + x^{42} + x^{30} + x^{28} + x^{26} + x^{24} + x^{18}, \\
p_{12}(x) &= x^{121} + x^{120} + x^{119} + x^{117} + x^{115} + x^{113} + x^{111} + x^{108} + x^{105} + x^{104} \\
&\quad + x^{103} + x^{100} + x^{97} + x^{96} + x^{95} + x^{92} + x^{89} + x^{88} + x^{87} + x^{84} + x^{81} \\
&\quad + x^{80} + x^{79} + x^{76} + x^{73} + x^{72} + x^{71} + x^{68} + x^{65} + x^{64} + x^{63} + x^{60} \\
&\quad + x^{53} + x^{52} + x^{51} + x^{48} + x^{25} + x^{24} + x^{23} + x^{21} + x^{19} + x^{17} + x^{15} \\
&\quad + x^{12} + x^{5} + x^{4} + x^{3} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{126} + x^{120} + x^{114} + x^{100} + x^{90} + x^{88} + x^{74} + x^{72} + x^{68} + x^{66} + x^{64} \\
&\quad + x^{56} + x^{44} + x^{40} + x^{36}, \\
p_3(x) &= x^{120} + x^{116} + x^{114} + x^{110} + x^{108} + x^{104} + x^{102} + x^{100} + x^{98} + x^{96} \\
&\quad + x^{94} + x^{92} + x^{86} + x^{82} + x^{80} + x^{78} + x^{76} + x^{70} + x^{60} + x^{58} + x^{54} \\
&\quad + x^{52} + x^{50} + x^{48} + x^{42} + x^{30} + x^{28} + x^{24}, \\
p_6(x) &= x^{120} + x^{118} + x^{116} + x^{110} + x^{102} + x^{100} + x^{96} + x^{94} + x^{92} + x^{86} \\
&\quad + x^{84} + x^{78} + x^{72} + x^{70} + x^{68} + x^{64} + x^{60} + x^{52} + x^{48} + x^{30} + x^{28} \\
&\quad + x^{24} + x^{22} + x^{20} + x^{16} + x^{6} + x^{4} + 1, \\
p_9(x) &= x^{118} + x^{114} + x^{112} + x^{102} + x^{98} + x^{94} + x^{88} + x^{84} + x^{82} + x^{72} + x^{68} \\
&\quad + x^{64} + x^{58} + x^{52} + x^{50} + x^{48} + x^{42} + x^{30} + x^{28} + x^{20} + x^{16} + x^{12}, \\
p_{12}(x) &= x^{118} + x^{116} + x^{112} + x^{54} + x^{52} + x^{48} + x^{22} + x^{20} + x^{16} + x^{6} + x^{4} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{126} + x^{122} + x^{118} + x^{116} + x^{112} + x^{108} + x^{104} + x^{100} + x^{92} + x^{90} \\
&\quad + x^{88} + x^{86} + x^{84} + x^{80} + x^{74} + x^{70} + x^{68} + x^{66} + x^{64} + x^{60} + x^{56} \\
&\quad + x^{54} + x^{52} + x^{48} + x^{44} + x^{40} + x^{36}, \\
p_3(x) &= x^{120} + x^{114} + x^{110} + x^{108} + x^{102} + x^{100} + x^{98} + x^{94} + x^{86} + x^{84} \\
&\quad + x^{82} + x^{80} + x^{78} + x^{76} + x^{72} + x^{70} + x^{68} + x^{64} + x^{60} + x^{58} + x^{56} \\
&\quad + x^{54} + x^{52} + x^{50} + x^{48} + x^{44} + x^{42} + x^{40} + x^{36} + x^{30} + x^{28} + x^{24}, \\
p_6(x) &= x^{120} + x^{118} + x^{114} + x^{112} + x^{98} + x^{88} + x^{84} + x^{82} + x^{72} + x^{68} + x^{64} \\
&\quad + x^{60} + x^{58} + x^{54} + x^{52} + x^{50} + x^{48} + x^{42} + x^{22} + x^{20} + x^{16} + x^{6} \\
&\quad + x^{4} + 1, \\
p_9(x) &= x^{118} + x^{114} + x^{112} + x^{102} + x^{98} + x^{94} + x^{88} + x^{84} + x^{82} + x^{72} + x^{68} \\
&\quad + x^{64} + x^{58} + x^{52} + x^{50} + x^{48} + x^{42} + x^{30} + x^{28} + x^{20} + x^{16} + x^{12}, \\
p_{12}(x) &= x^{118} + x^{116} + x^{112} + x^{54} + x^{52} + x^{48} + x^{22} + x^{20} + x^{16} + x^{6} + x^{4} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{126} + x^{123} + x^{118} + x^{117} + x^{115} + x^{113} + x^{112} + x^{110} + x^{109} + x^{106} \\
&\quad + x^{105} + x^{103} + x^{102} + x^{101} + x^{99} + x^{98} + x^{96} + x^{93} + x^{91} + x^{89} \\
&\quad + x^{87} + x^{85} + x^{84} + x^{81} + x^{78} + x^{75} + x^{74} + x^{67} + x^{66} + x^{65} + x^{63} \\
&\quad + x^{61} + x^{60} + x^{57} + x^{56} + x^{55} + x^{51} + x^{45} + x^{44} + x^{41} + x^{40} + x^{39} \\
&\quad + x^{36}, \\
p_3(x) &= x^{124} + x^{120} + x^{118} + x^{116} + x^{112} + x^{110} + x^{108} + x^{104} + x^{100} + x^{96} \\
&\quad + x^{86} + x^{78} + x^{76} + x^{72} + x^{70} + x^{54}, \\
p_6(x) &= x^{123} + x^{122} + x^{120} + x^{119} + x^{118} + x^{117} + x^{114} + x^{111} + x^{110} + x^{109} \\
&\quad + x^{107} + x^{104} + x^{99} + x^{98} + x^{96} + x^{93} + x^{92} + x^{90} + x^{89} + x^{88} + x^{86} \\
&\quad + x^{83} + x^{82} + x^{81} + x^{78} + x^{75} + x^{74} + x^{73} + x^{70} + x^{67} + x^{66} + x^{65} \\
&\quad + x^{63} + x^{60} + x^{59} + x^{58} + x^{56} + x^{55} + x^{54} + x^{53} + x^{50} + x^{45} + x^{44} \\
&\quad + x^{42} + x^{41} + x^{40} + x^{39} + x^{36}, \\
p_9(x) &= x^{122} + x^{120} + x^{118} + x^{116} + x^{108} + x^{106} + x^{104} + x^{102} + x^{100} + x^{96} \\
&\quad + x^{94} + x^{92} + x^{90} + x^{80} + x^{76} + x^{74} + x^{66} + x^{60} + x^{58} + x^{52} + x^{50} \\
&\quad + x^{48} + x^{42} + x^{30} + x^{28} + x^{26} + x^{24} + x^{18}, \\
p_{12}(x) &= x^{121} + x^{120} + x^{119} + x^{117} + x^{115} + x^{113} + x^{111} + x^{108} + x^{105} + x^{104} \\
&\quad + x^{103} + x^{100} + x^{97} + x^{96} + x^{95} + x^{92} + x^{89} + x^{88} + x^{87} + x^{84} + x^{81} \\
&\quad + x^{80} + x^{79} + x^{76} + x^{73} + x^{72} + x^{71} + x^{68} + x^{65} + x^{64} + x^{63} + x^{60}
\end{aligned}$$

$$+ x^{53} + x^{52} + x^{51} + x^{48} + x^{25} + x^{24} + x^{23} + x^{21} + x^{19} + x^{17} + x^{15} + x^{12} + x^{5} + x^{4} + x^{3} + 1,$$

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

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

$$\begin{aligned}
p_0(x) &= x^{126} + x^{123} + x^{118} + x^{117} + x^{115} + x^{113} + x^{112} + x^{110} + x^{109} + x^{106} \\
&\quad + x^{105} + x^{103} + x^{102} + x^{101} + x^{99} + x^{98} + x^{96} + x^{93} + x^{91} + x^{89} \\
&\quad + x^{87} + x^{85} + x^{84} + x^{81} + x^{78} + x^{75} + x^{74} + x^{67} + x^{66} + x^{65} + x^{63} \\
&\quad + x^{61} + x^{60} + x^{57} + x^{56} + x^{55} + x^{51} + x^{45} + x^{44} + x^{41} + x^{40} + x^{39} \\
&\quad + x^{36}, \\
p_3(x) &= x^{124} + x^{120} + x^{118} + x^{116} + x^{112} + x^{110} + x^{108} + x^{104} + x^{100} + x^{96} \\
&\quad + x^{86} + x^{78} + x^{76} + x^{72} + x^{70} + x^{54}, \\
p_6(x) &= x^{123} + x^{122} + x^{120} + x^{119} + x^{118} + x^{117} + x^{114} + x^{111} + x^{110} + x^{109} \\
&\quad + x^{107} + x^{104} + x^{99} + x^{98} + x^{96} + x^{93} + x^{92} + x^{90} + x^{89} + x^{88} + x^{86} \\
&\quad + x^{83} + x^{82} + x^{81} + x^{78} + x^{75} + x^{74} + x^{73} + x^{70} + x^{67} + x^{66} + x^{65} \\
&\quad + x^{63} + x^{60} + x^{59} + x^{58} + x^{56} + x^{55} + x^{54} + x^{53} + x^{50} + x^{45} + x^{44} \\
&\quad + x^{42} + x^{41} + x^{40} + x^{39} + x^{36}, \\
p_9(x) &= x^{122} + x^{120} + x^{118} + x^{116} + x^{108} + x^{106} + x^{104} + x^{102} + x^{100} + x^{96} \\
&\quad + x^{94} + x^{92} + x^{90} + x^{80} + x^{76} + x^{74} + x^{66} + x^{60} + x^{58} + x^{52} + x^{50} \\
&\quad + x^{48} + x^{42} + x^{30} + x^{28} + x^{26} + x^{24} + x^{18}, \\
p_{12}(x) &= x^{121} + x^{120} + x^{119} + x^{117} + x^{115} + x^{113} + x^{111} + x^{108} + x^{105} + x^{104} \\
&\quad + x^{103} + x^{100} + x^{97} + x^{96} + x^{95} + x^{92} + x^{89} + x^{88} + x^{87} + x^{84} + x^{81} \\
&\quad + x^{80} + x^{79} + x^{76} + x^{73} + x^{72} + x^{71} + x^{68} + x^{65} + x^{64} + x^{63} + x^{60} \\
&\quad + x^{53} + x^{52} + x^{51} + x^{48} + x^{25} + x^{24} + x^{23} + x^{21} + x^{19} + x^{17} + x^{15} \\
&\quad + x^{12} + x^{5} + x^{4} + x^{3} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{126} + x^{122} + x^{120} + x^{114} + x^{112} + x^{110} + x^{106} + x^{104} + x^{96} + x^{90} \\
&\quad + x^{82} + x^{80} + x^{78} + x^{76} + x^{72} + x^{68} + x^{64} + x^{60} + x^{58} + x^{56} + x^{52} \\
&\quad + x^{50} + x^{48} + x^{44} + x^{42} + x^{40} + x^{36}, \\
p_3(x) &= x^{120} + x^{118} + x^{116} + x^{114} + x^{110} + x^{108} + x^{104} + x^{100} + x^{98} + x^{96} \\
&\quad + x^{92} + x^{86} + x^{82} + x^{80} + x^{78} + x^{76} + x^{70} + x^{60} + x^{58} + x^{54} + x^{52} \\
&\quad + x^{50} + x^{48} + x^{42} + x^{28} + x^{24}, \\
p_6(x) &= x^{122} + x^{120} + x^{118} + x^{112} + x^{110} + x^{90} + x^{88} + x^{86} + x^{84} + x^{78} + x^{74} \\
&\quad + x^{72} + x^{70} + x^{68} + x^{66} + x^{64} + x^{60} + x^{54} + x^{52} + x^{48} + x^{20} + x^{16}
\end{aligned}$$

$$
\begin{aligned}
&+ x^{4} + 1,\\
p_9(x) &= x^{124} + x^{122} + x^{120} + x^{118} + x^{112} + x^{108} + x^{106} + x^{104} + x^{102} + x^{94}\\
&+ x^{92} + x^{90} + x^{84} + x^{76} + x^{74} + x^{68} + x^{66} + x^{64} + x^{58} + x^{52} + x^{50}\\
&+ x^{48} + x^{42} + x^{30} + x^{26} + x^{24} + x^{20} + x^{18} + x^{16} + x^{12},\\
p_{12}(x) &= x^{124} + x^{120} + x^{116} + x^{112} + x^{108} + x^{104} + x^{92} + x^{88} + x^{76} + x^{72}\\
&+ x^{52} + x^{48} + x^{28} + x^{24} + x^{20} + x^{16} + x^{4} + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{126} + x^{125} + x^{124} + x^{123} + x^{121} + x^{117} + x^{114} + x^{113} + x^{110} + x^{109}\\
&+ x^{107} + x^{105} + x^{104} + x^{103} + x^{101} + x^{100} + x^{98} + x^{97} + x^{95} + x^{92}\\
&+ x^{89} + x^{88} + x^{85} + x^{84} + x^{82} + x^{81} + x^{80} + x^{78} + x^{77} + x^{75} + x^{71}\\
&+ x^{68} + x^{65} + x^{64} + x^{63} + x^{60} + x^{59} + x^{58} + x^{56} + x^{55} + x^{52} + x^{51}\\
&+ x^{50} + x^{48} + x^{45} + x^{44} + x^{42} + x^{41} + x^{40} + x^{39} + x^{36},\\
p_3(x) &= x^{125} + x^{122} + x^{121} + x^{117} + x^{114} + x^{112} + x^{111} + x^{109} + x^{108} + x^{107}\\
&+ x^{101} + x^{98} + x^{96} + x^{93} + x^{92} + x^{90} + x^{87} + x^{85} + x^{82} + x^{81} + x^{80}\\
&+ x^{76} + x^{75} + x^{74} + x^{71} + x^{69} + x^{66} + x^{59} + x^{58} + x^{56} + x^{55} + x^{52}\\
&+ x^{51} + x^{50} + x^{48} + x^{45} + x^{44} + x^{42} + x^{41} + x^{40} + x^{39} + x^{36},\\
p_6(x) &= x^{125} + x^{122} + x^{121} + x^{120} + x^{119} + x^{118} + x^{115} + x^{112} + x^{109} + x^{108}\\
&+ x^{106} + x^{105} + x^{104} + x^{103} + x^{102} + x^{101} + x^{100} + x^{96} + x^{94} + x^{93}\\
&+ x^{92} + x^{90} + x^{89} + x^{87} + x^{85} + x^{80} + x^{77} + x^{76} + x^{74} + x^{73} + x^{71}\\
&+ x^{69} + x^{66} + x^{60} + x^{58} + x^{53} + x^{51} + x^{50} + x^{42} + x^{30} + x^{29} + x^{28}\\
&+ x^{26} + x^{25} + x^{24} + x^{23} + x^{20} + x^{19} + x^{18} + x^{16} + x^{5} + x^{4} + x^{3} + 1,\\
p_9(x) &= x^{125} + x^{124} + x^{123} + x^{120} + x^{109} + x^{108} + x^{107} + x^{104} + x^{93} + x^{92}\\
&+ x^{91} + x^{88} + x^{77} + x^{76} + x^{75} + x^{72} + x^{29} + x^{28} + x^{27} + x^{24},\\
p_{12}(x) &= x^{125} + x^{124} + x^{123} + x^{121} + x^{119} + x^{117} + x^{115} + x^{113} + x^{111} + x^{109}\\
&+ x^{107} + x^{105} + x^{103} + x^{100} + x^{97} + x^{96} + x^{95} + x^{93} + x^{91} + x^{89}\\
&+ x^{87} + x^{84} + x^{81} + x^{80} + x^{79} + x^{77} + x^{75} + x^{73} + x^{71} + x^{68} + x^{65}\\
&+ x^{64} + x^{63} + x^{60} + x^{53} + x^{52} + x^{51} + x^{48} + x^{29} + x^{28} + x^{27} + x^{25}\\
&+ x^{23} + x^{21} + x^{19} + x^{17} + x^{15} + x^{12} + x^{5} + x^{4} + x^{3} + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{132} + x^{129} + x^{127} + x^{126} + x^{122} + x^{121} + x^{119} + x^{115} + x^{114} + x^{113}\\
&+ x^{109} + x^{100} + x^{99} + x^{98} + x^{97} + x^{94} + x^{86} + x^{85} + x^{83} + x^{82} + x^{81}\\
&+ x^{79} + x^{78} + x^{77} + x^{75} + x^{74} + x^{73} + x^{71} + x^{70} + x^{69} + x^{63} + x^{61}
\end{aligned}
$$

$$
\begin{aligned}
&+ x^{59} + x^{58} + x^{57} + x^{55} + x^{54} + x^{53} + x^{47} + x^{45} + x^{36},\\
p_3(x) &= x^{125} + x^{124} + x^{122} + x^{119} + x^{118} + x^{116} + x^{115} + x^{114} + x^{113} + x^{110}\\
&+ x^{93} + x^{92} + x^{90} + x^{87} + x^{86} + x^{84} + x^{83} + x^{82} + x^{81} + x^{78} + x^{77}\\
&+ x^{76} + x^{74} + x^{71} + x^{70} + x^{69} + x^{67} + x^{65} + x^{63} + x^{60} + x^{59} + x^{58}\\
&+ x^{57} + x^{54},\\
p_6(x) &= x^{126} + x^{124} + x^{120} + x^{110} + x^{108} + x^{104} + x^{102} + x^{100} + x^{98} + x^{94}\\
&+ x^{88} + x^{66} + x^{64} + x^{62} + x^{56} + x^{50} + x^{48} + x^{46} + x^{42} + x^{36},\\
p_9(x) &= x^{127} + x^{126} + x^{125} + x^{122} + x^{119} + x^{118} + x^{117} + x^{114} + x^{111} + x^{110}\\
&+ x^{109} + x^{106} + x^{103} + x^{102} + x^{101} + x^{98} + x^{95} + x^{94} + x^{93} + x^{90}\\
&+ x^{87} + x^{86} + x^{85} + x^{82} + x^{79} + x^{78} + x^{77} + x^{74} + x^{71} + x^{70} + x^{69}\\
&+ x^{66} + x^{31} + x^{30} + x^{29} + x^{26} + x^{23} + x^{22} + x^{21} + x^{18},\\
p_{12}(x) &= x^{128} + x^{124} + x^{104} + x^{96} + x^{88} + x^{80} + x^{72} + x^{60} + x^{56} + x^{48} + x^{32}\\
&+ x^{28} + x^{16} + x^{12} + x^{8} + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{130} + x^{129} + x^{128} + x^{126} + x^{124} + x^{122} + x^{118} + x^{117} + x^{116} + x^{115}\\
&+ x^{105} + x^{104} + x^{100} + x^{97} + x^{92} + x^{91} + x^{90} + x^{89} + x^{88} + x^{86} + x^{85}\\
&+ x^{84} + x^{83} + x^{81} + x^{76} + x^{74} + x^{70} + x^{64} + x^{63} + x^{61} + x^{60} + x^{58}\\
&+ x^{56} + x^{55} + x^{54} + x^{53} + x^{48} + x^{47} + x^{45} + x^{36},\\
p_3(x) &= x^{129} + x^{128} + x^{126} + x^{125} + x^{124} + x^{123} + x^{121} + x^{118} + x^{117} + x^{116}\\
&+ x^{114} + x^{111} + x^{110} + x^{109} + x^{107} + x^{105} + x^{103} + x^{101} + x^{99} + x^{96}\\
&+ x^{95} + x^{94} + x^{92} + x^{87} + x^{86} + x^{84} + x^{83} + x^{82} + x^{80} + x^{77} + x^{76}\\
&+ x^{75} + x^{72} + x^{67} + x^{66} + x^{65} + x^{63} + x^{60} + x^{59} + x^{58} + x^{57} + x^{54},\\
p_6(x) &= x^{130} + x^{128} + x^{126} + x^{122} + x^{116} + x^{110} + x^{108} + x^{106} + x^{100} + x^{98}\\
&+ x^{96} + x^{92} + x^{86} + x^{84} + x^{80} + x^{78} + x^{76} + x^{72} + x^{62} + x^{60} + x^{58}\\
&+ x^{54} + x^{50} + x^{46} + x^{42} + x^{36},\\
p_9(x) &= x^{131} + x^{130} + x^{129} + x^{127} + x^{125} + x^{122} + x^{119} + x^{118} + x^{117} + x^{115}\\
&+ x^{113} + x^{111} + x^{109} + x^{106} + x^{103} + x^{102} + x^{101} + x^{99} + x^{97} + x^{95}\\
&+ x^{93} + x^{90} + x^{87} + x^{86} + x^{85} + x^{83} + x^{81} + x^{79} + x^{77} + x^{74} + x^{71}\\
&+ x^{70} + x^{69} + x^{66} + x^{35} + x^{34} + x^{33} + x^{31} + x^{29} + x^{26} + x^{23} + x^{22}\\
&+ x^{21} + x^{18},\\
p_{12}(x) &= x^{132} + x^{120} + x^{116} + x^{112} + x^{100} + x^{84} + x^{56} + x^{48} + x^{36} + x^{24} + x^{16}\\
&+ x^{8} + 1,
\end{aligned}
$$

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

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

$$\begin{aligned}
p_0(x) &= x^{126} + x^{124} + x^{121} + x^{120} + x^{119} + x^{114} + x^{113} + x^{109} + x^{108} + x^{105} \\
&\quad + x^{98} + x^{97} + x^{96} + x^{95} + x^{93} + x^{89} + x^{88} + x^{83} + x^{82} + x^{81} + x^{77} \\
&\quad + x^{75} + x^{73} + x^{72} + x^{69} + x^{68} + x^{67} + x^{64} + x^{59} + x^{58} + x^{56} + x^{55} \\
&\quad + x^{53} + x^{50} + x^{45} + x^{44} + x^{42} + x^{41} + x^{40} + x^{39} + x^{36}, \\
p_3(x) &= x^{125} + x^{123} + x^{119} + x^{117} + x^{116} + x^{114} + x^{113} + x^{109} + x^{107} + x^{105} \\
&\quad + x^{104} + x^{103} + x^{99} + x^{98} + x^{97} + x^{96} + x^{95} + x^{92} + x^{87} + x^{84} + x^{83} \\
&\quad + x^{82} + x^{81} + x^{77} + x^{75} + x^{73} + x^{72} + x^{69} + x^{68} + x^{67} + x^{64} + x^{59} \\
&\quad + x^{58} + x^{56} + x^{55} + x^{53} + x^{50} + x^{45} + x^{44} + x^{42} + x^{41} + x^{40} + x^{39} \\
&\quad + x^{36}, \\
p_6(x) &= x^{125} + x^{123} + x^{120} + x^{119} + x^{117} + x^{116} + x^{115} + x^{114} + x^{112} + x^{111} \\
&\quad + x^{110} + x^{109} + x^{106} + x^{105} + x^{104} + x^{103} + x^{102} + x^{98} + x^{96} + x^{94} \\
&\quad + x^{93} + x^{92} + x^{91} + x^{89} + x^{88} + x^{86} + x^{82} + x^{81} + x^{78} + x^{73} + x^{70} \\
&\quad + x^{60} + x^{59} + x^{56} + x^{55} + x^{54} + x^{53} + x^{52} + x^{48} + x^{45} + x^{44} + x^{41} \\
&\quad + x^{40} + x^{39} + x^{36} + x^{30} + x^{27} + x^{26} + x^{25} + x^{23} + x^{20} + x^{19} + x^{18} \\
&\quad + x^{16} + x^{5} + x^{4} + x^{3} + 1, \\
p_9(x) &= x^{125} + x^{124} + x^{123} + x^{120} + x^{109} + x^{108} + x^{107} + x^{104} + x^{93} + x^{92} \\
&\quad + x^{91} + x^{88} + x^{77} + x^{76} + x^{75} + x^{72} + x^{29} + x^{28} + x^{27} + x^{24}, \\
p_{12}(x) &= x^{125} + x^{124} + x^{123} + x^{121} + x^{119} + x^{117} + x^{115} + x^{113} + x^{111} + x^{109} \\
&\quad + x^{107} + x^{105} + x^{103} + x^{100} + x^{97} + x^{96} + x^{95} + x^{93} + x^{91} + x^{89} \\
&\quad + x^{87} + x^{84} + x^{81} + x^{80} + x^{79} + x^{77} + x^{75} + x^{73} + x^{71} + x^{68} + x^{65} \\
&\quad + x^{64} + x^{63} + x^{60} + x^{53} + x^{52} + x^{51} + x^{48} + x^{29} + x^{28} + x^{27} + x^{25} \\
&\quad + x^{23} + x^{21} + x^{19} + x^{17} + x^{15} + x^{12} + x^{5} + x^{4} + x^{3} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{126} + x^{125} + x^{124} + x^{123} + x^{121} + x^{117} + x^{114} + x^{113} + x^{110} + x^{109} \\
&\quad + x^{107} + x^{105} + x^{104} + x^{103} + x^{101} + x^{100} + x^{98} + x^{97} + x^{95} + x^{92} \\
&\quad + x^{89} + x^{88} + x^{85} + x^{84} + x^{82} + x^{81} + x^{80} + x^{78} + x^{77} + x^{75} + x^{71} \\
&\quad + x^{68} + x^{65} + x^{64} + x^{63} + x^{60} + x^{59} + x^{58} + x^{56} + x^{55} + x^{52} + x^{51} \\
&\quad + x^{50} + x^{48} + x^{45} + x^{44} + x^{42} + x^{41} + x^{40} + x^{39} + x^{36}, \\
p_3(x) &= x^{125} + x^{122} + x^{121} + x^{117} + x^{114} + x^{112} + x^{111} + x^{109} + x^{108} + x^{107} \\
&\quad + x^{101} + x^{98} + x^{96} + x^{93} + x^{92} + x^{90} + x^{87} + x^{85} + x^{82} + x^{81} + x^{80} \\
&\quad + x^{76} + x^{75} + x^{74} + x^{71} + x^{69} + x^{66} + x^{59} + x^{58} + x^{56} + x^{55} + x^{52} \\
&\quad + x^{51} + x^{50} + x^{48} + x^{45} + x^{44} + x^{42} + x^{41} + x^{40} + x^{39} + x^{36},
\end{aligned}$$

$$
\begin{aligned}
p_6(x) &= x^{125} + x^{122} + x^{121} + x^{120} + x^{119} + x^{118} + x^{115} + x^{112} + x^{109} + x^{108}\\
&\quad + x^{106} + x^{105} + x^{104} + x^{103} + x^{102} + x^{101} + x^{100} + x^{96} + x^{94} + x^{93}\\
&\quad + x^{92} + x^{90} + x^{89} + x^{87} + x^{85} + x^{80} + x^{77} + x^{76} + x^{74} + x^{73} + x^{71}\\
&\quad + x^{69} + x^{66} + x^{60} + x^{58} + x^{53} + x^{51} + x^{50} + x^{42} + x^{30} + x^{29} + x^{28}\\
&\quad + x^{26} + x^{25} + x^{24} + x^{23} + x^{20} + x^{19} + x^{18} + x^{16} + x^{5} + x^{4} + x^{3} + 1,\\
p_9(x) &= x^{125} + x^{124} + x^{123} + x^{120} + x^{109} + x^{108} + x^{107} + x^{104} + x^{93} + x^{92}\\
&\quad + x^{91} + x^{88} + x^{77} + x^{76} + x^{75} + x^{72} + x^{29} + x^{28} + x^{27} + x^{24},\\
p_{12}(x) &= x^{125} + x^{124} + x^{123} + x^{121} + x^{119} + x^{117} + x^{115} + x^{113} + x^{111} + x^{109}\\
&\quad + x^{107} + x^{105} + x^{103} + x^{100} + x^{97} + x^{96} + x^{95} + x^{93} + x^{91} + x^{89}\\
&\quad + x^{87} + x^{84} + x^{81} + x^{80} + x^{79} + x^{77} + x^{75} + x^{73} + x^{71} + x^{68} + x^{65}\\
&\quad + x^{64} + x^{63} + x^{60} + x^{53} + x^{52} + x^{51} + x^{48} + x^{29} + x^{28} + x^{27} + x^{25}\\
&\quad + x^{23} + x^{21} + x^{19} + x^{17} + x^{15} + x^{12} + x^{5} + x^{4} + x^{3} + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{130} + x^{129} + x^{128} + x^{126} + x^{124} + x^{122} + x^{118} + x^{117} + x^{116} + x^{115}\\
&\quad + x^{105} + x^{104} + x^{100} + x^{97} + x^{92} + x^{91} + x^{90} + x^{89} + x^{88} + x^{86} + x^{85}\\
&\quad + x^{84} + x^{83} + x^{81} + x^{76} + x^{74} + x^{70} + x^{64} + x^{63} + x^{61} + x^{60} + x^{58}\\
&\quad + x^{56} + x^{55} + x^{54} + x^{53} + x^{48} + x^{47} + x^{45} + x^{36},\\
p_3(x) &= x^{129} + x^{128} + x^{126} + x^{125} + x^{124} + x^{123} + x^{121} + x^{118} + x^{117} + x^{116}\\
&\quad + x^{114} + x^{111} + x^{110} + x^{109} + x^{107} + x^{105} + x^{103} + x^{101} + x^{99} + x^{96}\\
&\quad + x^{95} + x^{94} + x^{92} + x^{87} + x^{86} + x^{84} + x^{83} + x^{82} + x^{80} + x^{77} + x^{76}\\
&\quad + x^{75} + x^{72} + x^{67} + x^{66} + x^{65} + x^{63} + x^{60} + x^{59} + x^{58} + x^{57} + x^{54},\\
p_6(x) &= x^{130} + x^{128} + x^{126} + x^{122} + x^{116} + x^{110} + x^{108} + x^{106} + x^{100} + x^{98}\\
&\quad + x^{96} + x^{92} + x^{86} + x^{84} + x^{80} + x^{78} + x^{76} + x^{72} + x^{62} + x^{60} + x^{58}\\
&\quad + x^{54} + x^{50} + x^{46} + x^{42} + x^{36},\\
p_9(x) &= x^{131} + x^{130} + x^{129} + x^{127} + x^{125} + x^{122} + x^{119} + x^{118} + x^{117} + x^{115}\\
&\quad + x^{113} + x^{111} + x^{109} + x^{106} + x^{103} + x^{102} + x^{101} + x^{99} + x^{97} + x^{95}\\
&\quad + x^{93} + x^{90} + x^{87} + x^{86} + x^{85} + x^{83} + x^{81} + x^{79} + x^{77} + x^{74} + x^{71}\\
&\quad + x^{70} + x^{69} + x^{66} + x^{35} + x^{34} + x^{33} + x^{31} + x^{29} + x^{26} + x^{23} + x^{22}\\
&\quad + x^{21} + x^{18},\\
p_{12}(x) &= x^{132} + x^{120} + x^{116} + x^{112} + x^{100} + x^{84} + x^{56} + x^{48} + x^{36} + x^{24} + x^{16}\\
&\quad + x^{8} + 1,
\end{aligned}
$$

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

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

$$\begin{aligned}
p_0(x) &= x^{132} + x^{129} + x^{127} + x^{126} + x^{122} + x^{121} + x^{119} + x^{115} + x^{114} + x^{113} \\
&\quad + x^{109} + x^{100} + x^{99} + x^{98} + x^{97} + x^{94} + x^{86} + x^{85} + x^{83} + x^{82} + x^{81} \\
&\quad + x^{79} + x^{78} + x^{77} + x^{75} + x^{74} + x^{73} + x^{71} + x^{70} + x^{69} + x^{63} + x^{61} \\
&\quad + x^{59} + x^{58} + x^{57} + x^{55} + x^{54} + x^{53} + x^{47} + x^{45} + x^{36}, \\
p_3(x) &= x^{125} + x^{124} + x^{122} + x^{119} + x^{118} + x^{116} + x^{115} + x^{114} + x^{113} + x^{110} \\
&\quad + x^{93} + x^{92} + x^{90} + x^{87} + x^{86} + x^{84} + x^{83} + x^{82} + x^{81} + x^{78} + x^{77} \\
&\quad + x^{76} + x^{74} + x^{71} + x^{70} + x^{69} + x^{67} + x^{65} + x^{63} + x^{60} + x^{59} + x^{58} \\
&\quad + x^{57} + x^{54}, \\
p_6(x) &= x^{126} + x^{124} + x^{120} + x^{110} + x^{108} + x^{104} + x^{102} + x^{100} + x^{98} + x^{94} \\
&\quad + x^{88} + x^{66} + x^{64} + x^{62} + x^{56} + x^{50} + x^{48} + x^{46} + x^{42} + x^{36}, \\
p_9(x) &= x^{127} + x^{126} + x^{125} + x^{122} + x^{119} + x^{118} + x^{117} + x^{114} + x^{111} + x^{110} \\
&\quad + x^{109} + x^{106} + x^{103} + x^{102} + x^{101} + x^{98} + x^{95} + x^{94} + x^{93} + x^{90} \\
&\quad + x^{87} + x^{86} + x^{85} + x^{82} + x^{79} + x^{78} + x^{77} + x^{74} + x^{71} + x^{70} + x^{69} \\
&\quad + x^{66} + x^{31} + x^{30} + x^{29} + x^{26} + x^{23} + x^{22} + x^{21} + x^{18}, \\
p_{12}(x) &= x^{128} + x^{124} + x^{104} + x^{96} + x^{88} + x^{80} + x^{72} + x^{60} + x^{56} + x^{48} + x^{32} \\
&\quad + x^{28} + x^{16} + x^{12} + x^{8} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{126} + x^{124} + x^{121} + x^{120} + x^{119} + x^{114} + x^{113} + x^{109} + x^{108} + x^{105} \\
&\quad + x^{98} + x^{97} + x^{96} + x^{95} + x^{93} + x^{89} + x^{88} + x^{83} + x^{82} + x^{81} + x^{77} \\
&\quad + x^{75} + x^{73} + x^{72} + x^{69} + x^{68} + x^{67} + x^{64} + x^{59} + x^{58} + x^{56} + x^{55} \\
&\quad + x^{53} + x^{50} + x^{45} + x^{44} + x^{42} + x^{41} + x^{40} + x^{39} + x^{36}, \\
p_3(x) &= x^{125} + x^{123} + x^{119} + x^{117} + x^{116} + x^{114} + x^{113} + x^{109} + x^{107} + x^{105} \\
&\quad + x^{104} + x^{103} + x^{99} + x^{98} + x^{97} + x^{96} + x^{95} + x^{92} + x^{87} + x^{84} + x^{83} \\
&\quad + x^{82} + x^{81} + x^{77} + x^{75} + x^{73} + x^{72} + x^{69} + x^{68} + x^{67} + x^{64} + x^{59} \\
&\quad + x^{58} + x^{56} + x^{55} + x^{53} + x^{50} + x^{45} + x^{44} + x^{42} + x^{41} + x^{40} + x^{39} \\
&\quad + x^{36}, \\
p_6(x) &= x^{125} + x^{123} + x^{120} + x^{119} + x^{117} + x^{116} + x^{115} + x^{114} + x^{112} + x^{111} \\
&\quad + x^{110} + x^{109} + x^{106} + x^{105} + x^{104} + x^{103} + x^{102} + x^{98} + x^{96} + x^{94} \\
&\quad + x^{93} + x^{92} + x^{91} + x^{89} + x^{88} + x^{86} + x^{82} + x^{81} + x^{78} + x^{73} + x^{70} \\
&\quad + x^{60} + x^{59} + x^{56} + x^{55} + x^{54} + x^{53} + x^{52} + x^{48} + x^{45} + x^{44} + x^{41} \\
&\quad + x^{40} + x^{39} + x^{36} + x^{30} + x^{27} + x^{26} + x^{25} + x^{23} + x^{20} + x^{19} + x^{18} \\
&\quad + x^{16} + x^{5} + x^{4} + x^{3} + 1,
\end{aligned}$$

$$p_9(x) = x^{125} + x^{124} + x^{123} + x^{120} + x^{109} + x^{108} + x^{107} + x^{104} + x^{93} + x^{92} + x^{91} + x^{88} + x^{77} + x^{76} + x^{75} + x^{72} + x^{29} + x^{28} + x^{27} + x^{24},$$
$$p_{12}(x) = x^{125} + x^{124} + x^{123} + x^{121} + x^{119} + x^{117} + x^{115} + x^{113} + x^{111} + x^{109} + x^{107} + x^{105} + x^{103} + x^{100} + x^{97} + x^{96} + x^{95} + x^{93} + x^{91} + x^{89} + x^{87} + x^{84} + x^{81} + x^{80} + x^{79} + x^{77} + x^{75} + x^{73} + x^{71} + x^{68} + x^{65} + x^{64} + x^{63} + x^{60} + x^{53} + x^{52} + x^{51} + x^{48} + x^{29} + x^{28} + x^{27} + x^{25} + x^{23} + x^{21} + x^{19} + x^{17} + x^{15} + x^{12} + x^{5} + x^{4} + x^{3} + 1,$$

and the initial terms are [0, 0, 0, 0, 0, 0, 1, 0, 0, 1, 1, 1, 0, 0, 1, 1, 0, 0, 0, 0, 0, 1, 0, 0, 1, 1, 1, 0, 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]	703	[425, 1111]	1406	[1849, 1027]	2109	[1879, 833]
1	[3, 4]	704	[464, 1112]	1407	[1850, 776]	2110	[2412, 662]
2	[5, 6]	705	[1113, 521]	1408	[1851, 719]	2111	[2413, 2334]
3	[1, 7]	706	[1114, 517]	1409	[1790, 988]	2112	[2414, 294]
4	[8, 9]	707	[1115, 1116]	1410	[1852, 301]	2113	[2415, 1792]
5	[10, 11]	708	[170, 514]	1411	[358, 787]	2114	[960, 2416]
6	[12, 13]	709	[133, 37]	1412	[1853, 1485]	2115	[2417, 333]
7	[14, 15]	710	[140, 1117]	1413	[1854, 960]	2116	[851, 1681]
8	[16, 17]	711	[1118, 602]	1414	[1855, 743]	2117	[2418, 685]
9	[18, 19]	712	[1119, 503]	1415	[1856, 224]	2118	[237, 2419]
10	[20, 21]	713	[1120, 40]	1416	[1857, 1619]	2119	[2420, 91]
11	[22, 23]	714	[1121, 495]	1417	[1858, 1859]	2120	[2421, 1554]
12	[24, 25]	715	[1100, 644]	1418	[1860, 914]	2121	[1621, 2422]
13	[26, 27]	716	[1122, 1099]	1419	[1861, 1449]	2122	[1442, 1867]
14	[28, 29]	717	[1123, 402]	1420	[950, 1541]	2123	[2423, 2424]
15	[30, 31]	718	[1124, 415]	1421	[1862, 1863]	2124	[2301, 1481]
16	[32, 33]	719	[1125, 539]	1422	[1864, 1529]	2125	[2425, 946]
17	[34, 35]	720	[1126, 1127]	1423	[1865, 754]	2126	[1478, 1554]
18	[36, 37]	721	[1128, 1129]	1424	[1866, 1867]	2127	[2426, 1016]
19	[38, 39]	722	[1130, 649]	1425	[1688, 1571]	2128	[2427, 1785]
20	[10, 40]	723	[1131, 1132]	1426	[1868, 995]	2129	[2428, 679]
21	[41, 42]	724	[1133, 1134]	1427	[1869, 1493]	2130	[2429, 2430]
22	[43, 44]	725	[1135, 52]	1428	[1870, 1796]	2131	[2431, 2432]
23	[45, 46]	726	[454, 415]	1429	[1871, 692]	2132	[2433, 266]
24	[47, 48]	727	[1136, 1110]	1430	[1872, 943]	2133	[2434, 2422]
25	[49, 50]	728	[1137, 140]	1431	[1873, 1531]	2134	[269, 1708]
26	[51, 52]	729	[1138, 576]	1432	[1874, 1875]	2135	[2435, 2436]
27	[53, 54]	730	[1139, 158]	1433	[1876, 1877]	2136	[1485, 294]
28	[55, 56]	731	[1140, 1141]	1434	[1491, 774]	2137	[2437, 836]

29	[57, 58]	732	[1142, 175]	1435	[1579, 311]	2138	[2438, 2231]
30	[59, 60]	733	[434, 483]	1436	[1878, 1879]	2139	[2439, 2292]
31	[61, 62]	734	[1143, 432]	1437	[1880, 603]	2140	[1609, 898]
32	[63, 64]	735	[1144, 604]	1438	[1881, 1882]	2141	[205, 1650]
33	[65, 66]	736	[1145, 1134]	1439	[1883, 1326]	2142	[2440, 1021]
34	[67, 68]	737	[1146, 1147]	1440	[1884, 1885]	2143	[805, 2195]
35	[58, 69]	738	[1148, 1149]	1441	[621, 47]	2144	[2441, 792]
36	[70, 71]	739	[1150, 570]	1442	[1363, 1254]	2145	[1006, 733]
37	[72, 73]	740	[178, 583]	1443	[1220, 47]	2146	[2442, 319]
38	[74, 72]	741	[1151, 1152]	1444	[183, 596]	2147	[2443, 871]
39	[60, 75]	742	[1153, 556]	1445	[1886, 1299]	2148	[1450, 2444]
40	[76, 77]	743	[411, 13]	1446	[1227, 1193]	2149	[2445, 1638]
41	[78, 79]	744	[1154, 1155]	1447	[1081, 1308]	2150	[2446, 2447]
42	[80, 24]	745	[1156, 184]	1448	[1887, 600]	2151	[2448, 893]
43	[81, 82]	746	[1157, 1158]	1449	[1354, 1171]	2152	[2449, 1705]
44	[83, 84]	747	[1159, 1160]	1450	[1888, 649]	2153	[1766, 229]
45	[85, 86]	748	[52, 558]	1451	[1889, 1249]	2154	[2309, 1534]
46	[87, 88]	749	[634, 1111]	1452	[1285, 386]	2155	[776, 1875]
47	[89, 90]	750	[1161, 580]	1453	[149, 1160]	2156	[2450, 898]
48	[91, 92]	751	[1162, 1163]	1454	[1303, 1217]	2157	[2451, 1651]
49	[93, 94]	752	[1164, 116]	1455	[1890, 1891]	2158	[2452, 2453]
50	[95, 96]	753	[481, 1149]	1456	[1892, 153]	2159	[1824, 1027]
51	[97, 98]	754	[1165, 471]	1457	[1893, 546]	2160	[2454, 1019]
52	[99, 100]	755	[1166, 130]	1458	[180, 1278]	2161	[2455, 2419]
53	[101, 102]	756	[1167, 1168]	1459	[107, 1112]	2162	[2456, 2233]
54	[103, 104]	757	[1169, 1170]	1460	[1246, 464]	2163	[2457, 2458]
55	[105, 106]	758	[399, 1171]	1461	[1253, 1087]	2164	[79, 1792]
56	[107, 108]	759	[1172, 546]	1462	[1894, 1350]	2165	[2459, 1516]
57	[109, 110]	760	[1173, 618]	1463	[1895, 169]	2166	[2460, 209]
58	[111, 112]	761	[1174, 1175]	1464	[1896, 1415]	2167	[2360, 285]
59	[113, 114]	762	[1176, 1154]	1465	[1276, 596]	2168	[2461, 1017]
60	[115, 116]	763	[1177, 136]	1466	[1203, 503]	2169	[2462, 2394]
61	[117, 118]	764	[410, 380]	1467	[1897, 568]	2170	[2463, 291]
62	[119, 120]	765	[1138, 112]	1468	[1898, 1391]	2171	[2464, 2189]
63	[121, 122]	766	[187, 464]	1469	[129, 1155]	2172	[1615, 2465]
64	[123, 124]	767	[1178, 1179]	1470	[1899, 1355]	2173	[2376, 794]
65	[125, 126]	768	[1076, 617]	1471	[1900, 1139]	2174	[2466, 861]
66	[127, 128]	769	[451, 641]	1472	[395, 124]	2175	[2467, 1609]
67	[129, 130]	770	[419, 1098]	1473	[1901, 1177]	2176	[1844, 828]
68	[131, 132]	771	[1180, 641]	1474	[1129, 122]	2177	[7, 420]
69	[133, 134]	772	[589, 140]	1475	[1902, 1903]	2178	[2468, 2469]
70	[135, 136]	773	[1181, 1158]	1476	[1904, 1123]	2179	[1303, 616]
71	[137, 138]	774	[1182, 1183]	1477	[1905, 8]	2180	[2470, 1290]
72	[139, 140]	775	[1184, 578]	1478	[171, 1272]	2181	[1367, 9]

73	[141, 9]	776	[13, 555]	1479	[40, 1087]	2182	[2471, 1971]
74	[142, 143]	777	[1185, 1186]	1480	[1906, 1907]	2183	[1960, 190]
75	[144, 145]	778	[1187, 1188]	1481	[1319, 139]	2184	[2132, 1308]
76	[146, 147]	779	[1189, 476]	1482	[1908, 1187]	2185	[1225, 2039]
77	[148, 149]	780	[1190, 42]	1483	[1095, 1079]	2186	[2472, 2473]
78	[150, 151]	781	[1191, 1192]	1484	[187, 107]	2187	[2474, 382]
79	[152, 153]	782	[184, 1193]	1485	[1909, 539]	2188	[2475, 106]
80	[154, 155]	783	[1194, 482]	1486	[1910, 494]	2189	[415, 1152]
81	[156, 149]	784	[1195, 1196]	1487	[1911, 442]	2190	[2476, 2059]
82	[157, 158]	785	[1197, 1198]	1488	[1912, 1141]	2191	[1108, 1345]
83	[159, 160]	786	[1199, 31]	1489	[465, 164]	2192	[2477, 1417]
84	[161, 162]	787	[414, 1151]	1490	[1320, 133]	2193	[1343, 573]
85	[163, 164]	788	[1200, 1079]	1491	[1087, 1398]	2194	[2478, 1198]
86	[165, 166]	789	[555, 1201]	1492	[1097, 475]	2195	[2144, 391]
87	[167, 168]	790	[1202, 1203]	1493	[1913, 1180]	2196	[2479, 2066]
88	[169, 170]	791	[1204, 1205]	1494	[567, 639]	2197	[2480, 1256]
89	[12, 171]	792	[1179, 144]	1495	[1914, 1260]	2198	[1350, 199]
90	[172, 173]	793	[1206, 1207]	1496	[1915, 1916]	2199	[2481, 563]
91	[174, 175]	794	[1208, 1154]	1497	[1381, 1917]	2200	[585, 1944]
92	[176, 177]	795	[1209, 488]	1498	[1918, 504]	2201	[2482, 1246]
93	[178, 179]	796	[1058, 583]	1499	[38, 35]	2202	[2077, 477]
94	[180, 181]	797	[1150, 460]	1500	[9, 526]	2203	[2483, 40]
95	[182, 183]	798	[1210, 630]	1501	[1919, 1920]	2204	[639, 1123]
96	[184, 185]	799	[415, 1211]	1502	[1921, 1089]	2205	[2165, 1234]
97	[186, 187]	800	[1212, 508]	1503	[1128, 585]	2206	[2021, 2484]
98	[188, 189]	801	[552, 166]	1504	[1158, 411]	2207	[542, 42]
99	[190, 191]	802	[197, 1213]	1505	[1922, 1421]	2208	[2485, 1187]
100	[192, 138]	803	[124, 634]	1506	[1269, 1110]	2209	[2486, 1277]
101	[193, 194]	804	[1214, 479]	1507	[1923, 198]	2210	[2487, 190]
102	[195, 196]	805	[1215, 1176]	1508	[437, 1924]	2211	[1180, 452]
103	[153, 197]	806	[1216, 155]	1509	[52, 1079]	2212	[2488, 2489]
104	[198, 199]	807	[1217, 617]	1510	[394, 434]	2213	[2490, 182]
105	[200, 201]	808	[1218, 588]	1511	[1925, 1926]	2214	[1200, 558]
106	[202, 203]	809	[1219, 1220]	1512	[1264, 1132]	2215	[2081, 1344]
107	[204, 205]	810	[545, 499]	1513	[1927, 107]	2216	[2491, 616]
108	[206, 207]	811	[1221, 1222]	1514	[1928, 1184]	2217	[1333, 1234]
109	[208, 209]	812	[1223, 1224]	1515	[1929, 115]	2218	[2492, 2493]
110	[210, 211]	813	[1225, 1226]	1516	[1930, 1139]	2219	[2494, 1368]
111	[212, 213]	814	[1227, 185]	1517	[164, 511]	2220	[36, 134]
112	[214, 215]	815	[1228, 528]	1518	[1931, 401]	2221	[2056, 598]
113	[216, 217]	816	[1229, 1230]	1519	[1932, 1116]	2222	[1158, 380]
114	[218, 219]	817	[1231, 518]	1520	[1933, 51]	2223	[1280, 2174]
115	[220, 221]	818	[1232, 395]	1521	[1248, 1123]	2224	[2495, 394]
116	[222, 223]	819	[533, 197]	1522	[1934, 1260]	2225	[2496, 1145]

117	[224, 225]	820	[1233, 516]	1523	[189, 1371]	2226	[1921, 517]
118	[19, 226]	821	[124, 132]	1524	[1935, 1366]	2227	[2497, 436]
119	[227, 228]	822	[144, 1234]	1525	[1936, 1937]	2228	[1324, 107]
120	[229, 230]	823	[1235, 1236]	1526	[1938, 1382]	2229	[1974, 405]
121	[231, 232]	824	[1237, 1111]	1527	[1939, 1211]	2230	[2498, 192]
122	[233, 233]	825	[1238, 144]	1528	[1940, 439]	2231	[47, 471]
123	[234, 235]	826	[1239, 1240]	1529	[454, 1151]	2232	[2499, 2064]
124	[236, 237]	827	[1241, 435]	1530	[1941, 1942]	2233	[477, 1068]
125	[238, 214]	828	[1242, 608]	1531	[1943, 617]	2234	[2500, 2484]
126	[239, 240]	829	[1243, 169]	1532	[1944, 1270]	2235	[2501, 152]
127	[241, 242]	830	[1244, 474]	1533	[1945, 1186]	2236	[2101, 1073]
128	[243, 244]	831	[1245, 1246]	1534	[1059, 1149]	2237	[1384, 1995]
129	[245, 246]	832	[156, 170]	1535	[616, 519]	2238	[2502, 481]
130	[247, 248]	833	[406, 488]	1536	[1946, 1203]	2239	[1130, 1224]
131	[249, 250]	834	[1247, 194]	1537	[1305, 583]	2240	[2503, 1412]
132	[251, 252]	835	[1248, 644]	1538	[1947, 1250]	2241	[2504, 2505]
133	[253, 254]	836	[379, 142]	1539	[1900, 157]	2242	[2506, 2083]
134	[68, 255]	837	[1190, 543]	1540	[1948, 566]	2243	[1396, 399]
135	[256, 257]	838	[1249, 1250]	1541	[1332, 1205]	2244	[2027, 538]
136	[258, 259]	839	[1251, 1065]	1542	[1949, 1244]	2245	[111, 576]
137	[260, 261]	840	[420, 142]	1543	[533, 1388]	2246	[579, 170]
138	[262, 263]	841	[538, 550]	1544	[1950, 417]	2247	[491, 424]
139	[264, 265]	842	[1252, 126]	1545	[1951, 141]	2248	[2507, 1360]
140	[266, 267]	843	[1253, 489]	1546	[1952, 1953]	2249	[1408, 1351]
141	[268, 269]	844	[49, 173]	1547	[569, 130]	2250	[2487, 1069]
142	[15, 270]	845	[508, 1234]	1548	[1954, 1891]	2251	[1985, 1364]
143	[271, 272]	846	[106, 1254]	1549	[1955, 1956]	2252	[2508, 2509]
144	[273, 274]	847	[1255, 582]	1550	[1957, 1287]	2253	[2510, 2511]
145	[88, 275]	848	[1256, 1170]	1551	[1116, 428]	2254	[2120, 1917]
146	[276, 277]	849	[1257, 9]	1552	[1129, 1944]	2255	[607, 1193]
147	[278, 279]	850	[1258, 1259]	1553	[1958, 1404]	2256	[2512, 1364]
148	[280, 281]	851	[618, 1183]	1554	[1959, 1106]	2257	[1267, 136]
149	[282, 283]	852	[1260, 1131]	1555	[1116, 538]	2258	[2093, 1987]
150	[284, 285]	853	[1261, 1262]	1556	[1960, 1069]	2259	[2491, 1217]
151	[286, 287]	854	[1263, 420]	1557	[1961, 172]	2260	[1399, 395]
152	[288, 289]	855	[1144, 120]	1558	[1342, 1962]	2261	[2079, 1388]
153	[290, 291]	856	[1264, 486]	1559	[1963, 615]	2262	[2513, 198]
154	[292, 293]	857	[1265, 44]	1560	[379, 405]	2263	[2514, 2163]
155	[294, 295]	858	[1266, 455]	1561	[1964, 601]	2264	[2052, 2037]
156	[296, 297]	859	[1209, 407]	1562	[540, 458]	2265	[2515, 1268]
157	[298, 91]	860	[163, 466]	1563	[549, 173]	2266	[555, 1293]
158	[299, 300]	861	[1267, 422]	1564	[385, 1259]	2267	[520, 1222]
159	[301, 302]	862	[483, 132]	1565	[1965, 1401]	2268	[121, 1944]
160	[303, 304]	863	[485, 1151]	1566	[1342, 1279]	2269	[2516, 591]

161	[305, 306]	864	[1208, 569]	1567	[1966, 1967]	2270	[1310, 171]
162	[307, 308]	865	[1268, 495]	1568	[1968, 1969]	2271	[1430, 1168]
163	[309, 310]	866	[1269, 1270]	1569	[1124, 1151]	2272	[44, 477]
164	[311, 312]	867	[1271, 1272]	1570	[1970, 1971]	2273	[2517, 507]
165	[313, 314]	868	[489, 1273]	1571	[428, 550]	2274	[2518, 2519]
166	[315, 316]	869	[1274, 1275]	1572	[1136, 1270]	2275	[2520, 397]
167	[317, 318]	870	[639, 644]	1573	[1256, 1063]	2276	[1311, 184]
168	[319, 320]	871	[1276, 1143]	1574	[459, 570]	2277	[2521, 1207]
169	[321, 322]	872	[1069, 191]	1575	[1972, 1973]	2278	[1178, 507]
170	[323, 324]	873	[1277, 1278]	1576	[1974, 142]	2279	[1113, 1222]
171	[66, 325]	874	[531, 1279]	1577	[1145, 1425]	2280	[2168, 1345]
172	[326, 327]	875	[1280, 1281]	1578	[1975, 1976]	2281	[2522, 1382]
173	[328, 329]	876	[1282, 169]	1579	[648, 1224]	2282	[1347, 1112]
174	[330, 331]	877	[1283, 1284]	1580	[497, 1319]	2283	[1978, 1179]
175	[332, 333]	878	[1285, 1259]	1581	[495, 140]	2284	[550, 455]
176	[334, 335]	879	[1286, 1287]	1582	[128, 1073]	2285	[508, 145]
177	[336, 337]	880	[1288, 380]	1583	[1930, 157]	2286	[2523, 2524]
178	[338, 339]	881	[1188, 1089]	1584	[1977, 177]	2287	[637, 1132]
179	[340, 341]	882	[1289, 1290]	1585	[492, 177]	2288	[2525, 1942]
180	[342, 237]	883	[157, 1291]	1586	[436, 503]	2289	[396, 1969]
181	[343, 344]	884	[1292, 1201]	1587	[1978, 507]	2290	[2030, 631]
182	[345, 346]	885	[1272, 1293]	1588	[1088, 124]	2291	[1383, 1319]
183	[347, 348]	886	[1094, 1264]	1589	[1979, 1980]	2292	[2526, 158]
184	[349, 350]	887	[1294, 1194]	1590	[1981, 163]	2293	[2136, 631]
185	[351, 352]	888	[1295, 1296]	1591	[1982, 147]	2294	[2070, 521]
186	[353, 354]	889	[1297, 493]	1592	[502, 1184]	2295	[2527, 1433]
187	[355, 356]	890	[1298, 1299]	1593	[1983, 486]	2296	[1359, 118]
188	[357, 358]	891	[1300, 1301]	1594	[569, 1155]	2297	[2470, 2072]
189	[359, 276]	892	[1302, 1303]	1595	[1169, 1063]	2298	[2528, 603]
190	[360, 361]	893	[458, 134]	1596	[1984, 1415]	2299	[2529, 1217]
191	[362, 363]	894	[1304, 610]	1597	[1985, 1254]	2300	[1221, 521]
192	[364, 365]	895	[1305, 179]	1598	[1986, 1987]	2301	[404, 142]
193	[366, 367]	896	[560, 547]	1599	[1988, 1962]	2302	[1147, 598]
194	[368, 369]	897	[1306, 502]	1600	[1989, 645]	2303	[2530, 597]
195	[370, 371]	898	[1307, 1308]	1601	[147, 531]	2304	[2512, 1254]
196	[372, 373]	899	[135, 422]	1602	[442, 545]	2305	[1994, 1385]
197	[374, 326]	900	[448, 1209]	1603	[1990, 1991]	2306	[182, 463]
198	[375, 271]	901	[1223, 649]	1604	[1992, 1993]	2307	[2531, 1393]
199	[376, 377]	902	[1198, 1278]	1605	[621, 1083]	2308	[1986, 409]
200	[378, 379]	903	[1309, 1300]	1606	[1994, 1995]	2309	[2529, 616]
201	[33, 380]	904	[1310, 13]	1607	[1996, 1997]	2310	[2532, 2074]
202	[381, 382]	905	[1311, 547]	1608	[1998, 1967]	2311	[2533, 1240]
203	[383, 384]	906	[1312, 1313]	1609	[160, 391]	2312	[2534, 1944]
204	[385, 386]	907	[1132, 562]	1610	[1999, 1395]	2313	[1165, 48]

205	[387, 388]	908	[1314, 1315]	1611	[1156, 547]	2314	[1154, 130]
206	[389, 39]	909	[1316, 1317]	1612	[2000, 154]	2315	[1090, 2139]
207	[390, 391]	910	[1318, 604]	1613	[2001, 1357]	2316	[2535, 1226]
208	[392, 393]	911	[1319, 495]	1614	[2002, 1976]	2317	[2053, 1924]
209	[394, 395]	912	[1320, 458]	1615	[2003, 54]	2318	[2536, 1070]
210	[396, 397]	913	[1321, 390]	1616	[2004, 598]	2319	[2537, 1920]
211	[398, 399]	914	[1322, 1117]	1617	[466, 1106]	2320	[2538, 1061]
212	[400, 401]	915	[1323, 134]	1618	[1137, 387]	2321	[2539, 1888]
213	[402, 403]	916	[46, 162]	1619	[1139, 1291]	2322	[531, 1962]
214	[404, 405]	917	[1324, 464]	1620	[2005, 1236]	2323	[2526, 1291]
215	[406, 407]	918	[1325, 1176]	1621	[2006, 1096]	2324	[2540, 33]
216	[408, 409]	919	[1141, 1326]	1622	[2007, 2008]	2325	[2541, 2022]
217	[410, 411]	920	[1060, 1209]	1623	[119, 604]	2326	[2542, 480]
218	[412, 413]	921	[1327, 1328]	1624	[538, 442]	2327	[2543, 2037]
219	[414, 415]	922	[638, 1100]	1625	[2009, 174]	2328	[2040, 1211]
220	[416, 417]	923	[1329, 454]	1626	[2010, 139]	2329	[2154, 1145]
221	[418, 419]	924	[564, 466]	1627	[2011, 1956]	2330	[2544, 563]
222	[420, 405]	925	[550, 545]	1628	[2012, 1199]	2331	[2545, 2066]
223	[421, 422]	926	[1330, 1175]	1629	[1236, 1268]	2332	[2546, 1897]
224	[423, 424]	927	[1331, 403]	1630	[2013, 2014]	2333	[2014, 399]
225	[425, 426]	928	[463, 596]	1631	[547, 1193]	2334	[2064, 1061]
226	[427, 428]	929	[1332, 474]	1632	[2015, 2016]	2335	[2496, 1412]
227	[429, 430]	930	[560, 184]	1633	[1344, 1360]	2336	[2507, 1345]
228	[431, 432]	931	[1333, 145]	1634	[2017, 29]	2337	[2547, 1167]
229	[433, 434]	932	[1334, 621]	1635	[2018, 2019]	2338	[2548, 176]
230	[435, 172]	933	[1335, 1293]	1636	[1121, 139]	2339	[2549, 1177]
231	[436, 437]	934	[457, 133]	1637	[549, 50]	2340	[1233, 116]
232	[438, 183]	935	[1336, 1213]	1638	[423, 1073]	2341	[2031, 1147]
233	[439, 440]	936	[1337, 647]	1639	[2020, 552]	2342	[544, 455]
234	[441, 442]	937	[1338, 1188]	1640	[2021, 2022]	2343	[2550, 2066]
235	[443, 444]	938	[1339, 187]	1641	[2023, 1187]	2344	[2551, 430]
236	[445, 128]	939	[1164, 516]	1642	[2024, 1273]	2345	[2121, 2072]
237	[446, 447]	940	[1340, 457]	1643	[2025, 2026]	2346	[2000, 631]
238	[448, 406]	941	[1282, 579]	1644	[2027, 428]	2347	[1232, 434]
239	[449, 450]	942	[403, 1180]	1645	[1176, 569]	2348	[619, 1291]
240	[451, 452]	943	[196, 452]	1646	[1968, 397]	2349	[2552, 1363]
241	[453, 454]	944	[1341, 1342]	1647	[2028, 1108]	2350	[503, 1924]
242	[442, 455]	945	[1284, 1129]	1648	[2029, 391]	2351	[2553, 1145]
243	[456, 191]	946	[1343, 526]	1649	[2030, 154]	2352	[2538, 523]
244	[457, 458]	947	[1344, 1345]	1650	[1918, 1924]	2353	[2554, 2016]
245	[459, 460]	948	[1346, 1192]	1651	[106, 1364]	2354	[2527, 1417]
246	[461, 440]	949	[1347, 108]	1652	[2031, 597]	2355	[568, 1154]
247	[462, 463]	950	[631, 155]	1653	[1242, 155]	2356	[2555, 2473]
248	[464, 108]	951	[33, 411]	1654	[582, 179]	2357	[1236, 1319]

249	[465, 466]	952	[1348, 1313]	1655	[2032, 446]	2358	[169, 149]
250	[467, 468]	953	[1349, 1328]	1656	[2033, 1903]	2359	[2535, 2039]
251	[469, 470]	954	[183, 1143]	1657	[44, 1067]	2360	[2515, 1319]
252	[471, 472]	955	[1350, 1351]	1658	[1217, 519]	2361	[2556, 1374]
253	[473, 474]	956	[1352, 181]	1659	[2034, 601]	2362	[2557, 421]
254	[475, 133]	957	[1353, 581]	1660	[172, 50]	2363	[2558, 2493]
255	[476, 477]	958	[378, 420]	1661	[2035, 8]	2364	[2559, 182]
256	[478, 479]	959	[1354, 118]	1662	[2036, 1916]	2365	[2143, 603]
257	[480, 463]	960	[1355, 468]	1663	[2037, 1308]	2366	[2094, 1068]
258	[481, 482]	961	[1356, 1357]	1664	[2038, 2039]	2367	[2560, 1937]
259	[395, 483]	962	[1358, 1301]	1665	[2040, 1152]	2368	[2561, 445]
260	[484, 485]	963	[1359, 1171]	1666	[2041, 1169]	2369	[421, 136]
261	[486, 38]	964	[1108, 1360]	1667	[1413, 1063]	2370	[1416, 1433]
262	[487, 488]	965	[1361, 1362]	1668	[2042, 2043]	2371	[2029, 1243]
263	[11, 489]	966	[635, 1168]	1669	[2044, 1980]	2372	[2562, 1997]
264	[490, 491]	967	[547, 185]	1670	[2045, 390]	2373	[2479, 2563]
265	[492, 493]	968	[1363, 1364]	1671	[398, 1354]	2374	[1204, 474]
266	[494, 470]	969	[1365, 1277]	1672	[418, 402]	2375	[2564, 481]
267	[495, 387]	970	[1366, 570]	1673	[2046, 1882]	2376	[1151, 1211]
268	[496, 497]	971	[1367, 509]	1674	[2047, 1112]	2377	[2167, 406]
269	[498, 499]	972	[1368, 585]	1675	[2037, 2048]	2378	[1114, 1089]
270	[29, 500]	973	[1220, 1083]	1676	[2049, 1362]	2379	[2565, 2566]
271	[501, 502]	974	[148, 170]	1677	[2050, 1190]	2380	[2567, 580]
272	[503, 504]	975	[1369, 1220]	1678	[1188, 517]	2381	[2568, 1091]
273	[505, 506]	976	[1370, 1371]	1679	[2051, 2014]	2382	[1910, 1184]
274	[507, 508]	977	[1372, 164]	1680	[2052, 1081]	2383	[2569, 174]
275	[8, 509]	978	[1373, 1374]	1681	[2053, 504]	2384	[2116, 397]
276	[48, 189]	979	[1375, 476]	1682	[2054, 110]	2385	[1939, 1152]
277	[510, 511]	980	[1376, 38]	1683	[2055, 427]	2386	[2570, 1303]
278	[512, 160]	981	[176, 493]	1684	[2056, 1389]	2387	[2571, 1332]
279	[513, 514]	982	[1377, 1100]	1685	[1313, 399]	2388	[435, 549]
280	[40, 489]	983	[1100, 1123]	1686	[2057, 115]	2389	[480, 183]
281	[515, 516]	984	[1119, 437]	1687	[2058, 2059]	2390	[2572, 2469]
282	[517, 518]	985	[1378, 568]	1688	[1888, 1224]	2391	[2573, 1385]
283	[519, 46]	986	[1198, 181]	1689	[408, 1987]	2392	[530, 1342]
284	[520, 521]	987	[1379, 1103]	1690	[117, 1171]	2393	[2574, 1081]
285	[522, 523]	988	[1380, 614]	1691	[2060, 1256]	2394	[1133, 1425]
286	[524, 409]	989	[1194, 1149]	1692	[11, 1087]	2395	[2575, 1069]
287	[525, 526]	990	[1083, 471]	1693	[2061, 2008]	2396	[1216, 608]
288	[527, 528]	991	[1381, 1382]	1694	[596, 444]	2397	[614, 172]
289	[529, 500]	992	[1383, 1268]	1695	[1277, 181]	2398	[2576, 490]
290	[530, 531]	993	[1384, 1385]	1696	[1062, 1170]	2399	[2577, 2578]
291	[532, 533]	994	[1386, 450]	1697	[509, 526]	2400	[2579, 480]
292	[534, 535]	995	[1387, 1098]	1698	[553, 1139]	2401	[1959, 511]

293	[536, 173]	996	[1092, 1388]	1699	[147, 1342]	2402	[2580, 2581]
294	[537, 538]	997	[1147, 1389]	1700	[515, 116]	2403	[2100, 471]
295	[539, 517]	998	[1390, 1391]	1701	[476, 1067]	2404	[1080, 2037]
296	[540, 133]	999	[427, 538]	1702	[2062, 591]	2405	[2483, 11]
297	[541, 447]	1000	[1392, 1393]	1703	[1983, 1132]	2406	[2568, 2139]
298	[542, 543]	1001	[1260, 1264]	1704	[2063, 1163]	2407	[2582, 582]
299	[544, 545]	1002	[1394, 1395]	1705	[509, 573]	2408	[2583, 2174]
300	[546, 547]	1003	[1396, 1354]	1706	[2064, 523]	2409	[2175, 631]
301	[548, 549]	1004	[1397, 1398]	1707	[160, 1243]	2410	[1340, 475]
302	[441, 550]	1005	[1399, 434]	1708	[1434, 1962]	2411	[536, 50]
303	[551, 552]	1006	[463, 1143]	1709	[2065, 2066]	2412	[2584, 1167]
304	[553, 157]	1007	[1400, 1401]	1710	[505, 191]	2413	[2585, 2586]
305	[431, 444]	1008	[399, 118]	1711	[1283, 1368]	2414	[2477, 1433]
306	[554, 555]	1009	[1402, 1296]	1712	[2067, 645]	2415	[2522, 1917]
307	[556, 557]	1010	[1403, 1404]	1713	[2068, 190]	2416	[1927, 464]
308	[138, 558]	1011	[1401, 1061]	1714	[2069, 492]	2417	[2587, 1300]
309	[559, 560]	1012	[1405, 1199]	1715	[2070, 1222]	2418	[2588, 1399]
310	[561, 562]	1013	[588, 1342]	1716	[1166, 1155]	2419	[2117, 1067]
311	[563, 543]	1014	[1406, 1085]	1717	[128, 424]	2420	[2589, 176]
312	[564, 164]	1015	[1407, 491]	1718	[2071, 533]	2421	[1999, 413]
313	[565, 566]	1016	[616, 617]	1719	[524, 1987]	2422	[1988, 1279]
314	[452, 567]	1017	[1388, 384]	1720	[1289, 2072]	2423	[2590, 1993]
315	[568, 569]	1018	[1085, 625]	1721	[1341, 531]	2424	[1094, 1131]
316	[563, 42]	1019	[1408, 199]	1722	[2073, 2074]	2425	[1107, 1344]
317	[528, 570]	1020	[1372, 466]	1723	[2075, 393]	2426	[2591, 2592]
318	[571, 572]	1021	[1409, 1154]	1724	[497, 1268]	2427	[2593, 2594]
319	[7, 379]	1022	[1131, 486]	1725	[2076, 413]	2428	[2595, 648]
320	[9, 573]	1023	[1410, 575]	1726	[2077, 1067]	2429	[2596, 2489]
321	[574, 385]	1024	[122, 1270]	1727	[2078, 1973]	2430	[391, 169]
322	[575, 576]	1025	[458, 37]	1728	[2079, 197]	2431	[2485, 1125]
323	[577, 578]	1026	[1411, 1275]	1729	[190, 506]	2432	[510, 1106]
324	[579, 149]	1027	[1409, 569]	1730	[428, 442]	2433	[2597, 1953]
325	[126, 112]	1028	[1412, 1134]	1731	[2080, 1233]	2434	[2528, 119]
326	[580, 581]	1029	[1413, 1170]	1732	[2081, 1108]	2435	[2537, 2509]
327	[582, 583]	1030	[1352, 1278]	1733	[2082, 2083]	2436	[2534, 122]
328	[584, 585]	1031	[1414, 1415]	1734	[2084, 1169]	2437	[2598, 1190]
329	[477, 586]	1032	[1416, 1417]	1735	[2085, 2086]	2438	[2599, 2578]
330	[587, 588]	1033	[1418, 1068]	1736	[502, 494]	2439	[2600, 1284]
331	[589, 387]	1034	[1419, 1251]	1737	[2087, 1244]	2440	[2127, 2509]
332	[590, 407]	1035	[485, 415]	1738	[630, 494]	2441	[2601, 1355]
333	[591, 385]	1036	[1420, 1421]	1739	[1911, 550]	2442	[2602, 151]
334	[592, 2]	1037	[633, 132]	1740	[2088, 394]	2443	[2068, 1069]
335	[593, 594]	1038	[1070, 1139]	1741	[1266, 545]	2444	[1177, 422]
336	[595, 596]	1039	[1422, 1423]	1742	[1087, 1273]	2445	[2171, 1290]

337	[597, 598]	1040	[641, 1099]	1743	[2089, 497]	2446	[2543, 1081]
338	[599, 600]	1041	[1424, 564]	1744	[1297, 177]	2447	[2110, 1131]
339	[601, 602]	1042	[1412, 1425]	1745	[2090, 475]	2448	[2603, 2581]
340	[525, 573]	1043	[640, 452]	1746	[1943, 519]	2449	[170, 1160]
341	[603, 604]	1044	[1377, 639]	1747	[2091, 2092]	2450	[2138, 1091]
342	[605, 606]	1045	[567, 1100]	1748	[2093, 409]	2451	[2604, 2505]
343	[607, 185]	1046	[1426, 567]	1749	[2094, 586]	2452	[2605, 2519]
344	[154, 608]	1047	[196, 641]	1750	[2095, 2086]	2453	[615, 1217]
345	[609, 610]	1048	[1427, 402]	1751	[2010, 495]	2454	[2583, 1281]
346	[611, 612]	1049	[1428, 1429]	1752	[2096, 141]	2455	[2023, 1125]
347	[141, 509]	1050	[1430, 557]	1753	[153, 1388]	2456	[513, 1160]
348	[613, 614]	1051	[1431, 1091]	1754	[1083, 48]	2457	[1984, 2131]
349	[466, 511]	1052	[1148, 482]	1755	[1944, 1110]	2458	[1928, 494]
350	[132, 426]	1053	[1432, 1433]	1756	[2097, 615]	2459	[2170, 1425]
351	[562, 35]	1054	[1434, 1279]	1757	[2098, 1249]	2460	[1306, 630]
352	[615, 616]	1055	[1435, 1436]	1758	[1244, 1205]	2461	[2606, 2043]
353	[617, 618]	1056	[630, 1184]	1759	[115, 516]	2462	[2062, 174]
354	[619, 158]	1057	[1437, 340]	1760	[1313, 1354]	2463	[2607, 1262]
355	[620, 621]	1058	[1438, 1439]	1761	[2099, 1179]	2464	[1272, 1201]
356	[622, 623]	1059	[1440, 775]	1762	[2100, 48]	2465	[1101, 437]
357	[475, 458]	1060	[1441, 1442]	1763	[2101, 424]	2466	[2608, 2524]
358	[624, 625]	1061	[1443, 1444]	1764	[1123, 419]	2467	[584, 1129]
359	[626, 143]	1062	[1445, 322]	1765	[2102, 1127]	2468	[2609, 2610]
360	[627, 628]	1063	[1446, 1447]	1766	[2103, 435]	2469	[2611, 2244]
361	[629, 630]	1064	[1448, 307]	1767	[1143, 444]	2470	[2612, 1449]
362	[631, 608]	1065	[1449, 1450]	1768	[1366, 460]	2471	[2613, 2614]
363	[434, 124]	1066	[1451, 986]	1769	[2104, 2092]	2472	[2615, 349]
364	[632, 560]	1067	[1452, 351]	1770	[1081, 2048]	2473	[2616, 2617]
365	[633, 634]	1068	[1453, 1454]	1771	[2105, 439]	2474	[2320, 2618]
366	[635, 557]	1069	[1455, 1456]	1772	[139, 387]	2475	[985, 2309]
367	[546, 184]	1070	[1457, 299]	1773	[2106, 1900]	2476	[2619, 302]
368	[636, 11]	1071	[1458, 895]	1774	[597, 1389]	2477	[2620, 850]
369	[637, 486]	1072	[361, 1459]	1775	[2107, 1399]	2478	[2621, 1824]
370	[638, 639]	1073	[832, 1460]	1776	[2108, 388]	2479	[248, 928]
371	[640, 641]	1074	[1461, 1050]	1777	[2109, 535]	2480	[2622, 1500]
372	[642, 643]	1075	[1462, 954]	1778	[585, 122]	2481	[2371, 2256]
373	[644, 419]	1076	[1463, 87]	1779	[2038, 1226]	2482	[2623, 2610]
374	[645, 572]	1077	[774, 1446]	1780	[2110, 1264]	2483	[2624, 2625]
375	[646, 647]	1078	[1464, 1465]	1781	[2111, 1991]	2484	[2626, 2627]
376	[648, 649]	1079	[267, 1466]	1782	[391, 579]	2485	[2628, 1601]
377	[411, 171]	1080	[1467, 217]	1783	[2112, 1196]	2486	[2629, 1705]
378	[650, 651]	1081	[1468, 1469]	1784	[2113, 606]	2487	[1555, 2630]
379	[4, 319]	1082	[1470, 1471]	1785	[175, 1259]	2488	[2366, 871]
380	[652, 653]	1083	[1472, 802]	1786	[2114, 2]	2489	[2631, 2632]

381	[654, 99]	1084	[1473, 1474]	1787	[1938, 1917]	2490	[2633, 787]
382	[655, 656]	1085	[1475, 1476]	1788	[2115, 1131]	2491	[2634, 263]
383	[657, 658]	1086	[1477, 1478]	1789	[2116, 1969]	2492	[1799, 1514]
384	[659, 660]	1087	[21, 1479]	1790	[2117, 477]	2493	[2635, 2636]
385	[661, 662]	1088	[990, 251]	1791	[2118, 1423]	2494	[2637, 1529]
386	[331, 663]	1089	[957, 374]	1792	[2119, 1083]	2495	[2355, 743]
387	[664, 261]	1090	[1480, 1481]	1793	[2120, 1382]	2496	[2424, 2248]
388	[265, 665]	1091	[1482, 1483]	1794	[2121, 1290]	2497	[2638, 748]
389	[666, 667]	1092	[1484, 1485]	1795	[2122, 1436]	2498	[2639, 262]
390	[668, 321]	1093	[1486, 1487]	1796	[1082, 47]	2499	[2640, 2179]
391	[669, 282]	1094	[1488, 1489]	1797	[614, 549]	2500	[2422, 336]
392	[670, 671]	1095	[1028, 1490]	1798	[2028, 1344]	2501	[2641, 2243]
393	[672, 673]	1096	[1050, 1491]	1799	[1418, 586]	2502	[2642, 1551]
394	[674, 675]	1097	[1492, 253]	1800	[2123, 1429]	2503	[226, 1688]
395	[676, 677]	1098	[1493, 770]	1801	[2124, 1094]	2504	[2643, 89]
396	[678, 679]	1099	[335, 1040]	1802	[2125, 1366]	2505	[2644, 2348]
397	[680, 681]	1100	[314, 1494]	1803	[539, 1089]	2506	[2645, 2259]
398	[682, 683]	1101	[1495, 350]	1804	[1895, 579]	2507	[2646, 1637]
399	[684, 685]	1102	[1496, 258]	1805	[443, 432]	2508	[2647, 1636]
400	[686, 347]	1103	[1497, 1498]	1806	[175, 386]	2509	[2648, 1860]
401	[687, 688]	1104	[1499, 1500]	1807	[2126, 485]	2510	[2649, 669]
402	[213, 689]	1105	[1501, 1502]	1808	[2127, 1920]	2511	[2650, 2651]
403	[690, 691]	1106	[728, 1484]	1809	[2128, 2039]	2512	[2652, 702]
404	[692, 271]	1107	[1503, 1504]	1810	[2047, 108]	2513	[1724, 2280]
405	[651, 693]	1108	[1505, 1506]	1811	[2024, 1398]	2514	[356, 946]
406	[694, 328]	1109	[1507, 103]	1812	[1086, 489]	2515	[2653, 254]
407	[695, 696]	1110	[232, 1508]	1813	[1099, 639]	2516	[2654, 332]
408	[697, 698]	1111	[820, 1509]	1814	[2129, 1058]	2517	[2655, 2656]
409	[699, 700]	1112	[789, 1510]	1815	[2130, 2131]	2518	[2657, 277]
410	[701, 26]	1113	[1511, 1512]	1816	[2132, 2048]	2519	[2658, 764]
411	[64, 702]	1114	[1513, 361]	1817	[2133, 1251]	2520	[976, 340]
412	[703, 704]	1115	[1514, 904]	1818	[528, 460]	2521	[2659, 2660]
413	[705, 706]	1116	[1515, 1516]	1819	[2134, 2135]	2522	[2661, 709]
414	[707, 708]	1117	[966, 1517]	1820	[2136, 154]	2523	[1681, 2312]
415	[709, 710]	1118	[1518, 771]	1821	[2119, 47]	2524	[2662, 1616]
416	[711, 712]	1119	[1519, 916]	1822	[2137, 492]	2525	[1597, 21]
417	[713, 714]	1120	[1520, 830]	1823	[1237, 426]	2526	[223, 800]
418	[715, 221]	1121	[941, 1469]	1824	[437, 504]	2527	[2663, 748]
419	[716, 717]	1122	[1521, 922]	1825	[2138, 2139]	2528	[2664, 1724]
420	[718, 719]	1123	[927, 870]	1826	[548, 172]	2529	[2665, 100]
421	[720, 721]	1124	[1522, 1523]	1827	[1904, 644]	2530	[1859, 1633]
422	[722, 723]	1125	[1524, 797]	1828	[1268, 139]	2531	[2666, 915]
423	[724, 725]	1126	[1525, 80]	1829	[2140, 1147]	2532	[2667, 2333]
424	[242, 726]	1127	[1526, 1527]	1830	[1307, 2048]	2533	[2668, 1534]

425	[727, 728]	1128	[1528, 233]	1831	[2141, 2142]	2534	[211, 1766]
426	[729, 730]	1129	[1529, 805]	1832	[2143, 119]	2535	[2669, 1742]
427	[731, 732]	1130	[1530, 90]	1833	[2144, 1243]	2536	[2670, 298]
428	[733, 734]	1131	[1531, 1532]	1834	[149, 514]	2537	[2671, 2403]
429	[735, 736]	1132	[333, 891]	1835	[1431, 2139]	2538	[2672, 744]
430	[737, 738]	1133	[1533, 897]	1836	[595, 1143]	2539	[827, 2360]
431	[739, 740]	1134	[1534, 1535]	1837	[2145, 427]	2540	[1836, 2673]
432	[257, 741]	1135	[1536, 267]	1838	[2146, 1351]	2541	[2189, 2378]
433	[742, 244]	1136	[1537, 1538]	1839	[2014, 1354]	2542	[2674, 2228]
434	[743, 744]	1137	[1539, 1439]	1840	[2147, 1233]	2543	[2675, 2453]
435	[745, 95]	1138	[1540, 1494]	1841	[462, 183]	2544	[1821, 80]
436	[746, 747]	1139	[1541, 1471]	1842	[2148, 1230]	2545	[2296, 1803]
437	[748, 749]	1140	[1542, 1543]	1843	[2149, 2150]	2546	[2676, 1586]
438	[750, 327]	1141	[1544, 372]	1844	[390, 1243]	2547	[2677, 1576]
439	[751, 752]	1142	[1545, 276]	1845	[2151, 2150]	2548	[2678, 2397]
440	[704, 753]	1143	[346, 651]	1846	[2152, 1995]	2549	[2260, 258]
441	[754, 755]	1144	[1546, 1547]	1847	[1257, 509]	2550	[2233, 1557]
442	[274, 756]	1145	[1548, 659]	1848	[2153, 119]	2551	[1816, 298]
443	[757, 15]	1146	[973, 989]	1849	[2154, 1412]	2552	[2679, 2424]
444	[721, 758]	1147	[1549, 247]	1850	[2155, 436]	2553	[2617, 1663]
445	[759, 760]	1148	[1550, 734]	1851	[2156, 1317]	2554	[2680, 652]
446	[761, 371]	1149	[1551, 1552]	1852	[2140, 597]	2555	[2681, 931]
447	[762, 763]	1150	[1553, 919]	1853	[2157, 628]	2556	[2682, 2630]
448	[764, 695]	1151	[1554, 885]	1854	[2158, 114]	2557	[1788, 722]
449	[765, 766]	1152	[708, 1555]	1855	[2159, 2160]	2558	[2282, 1543]
450	[767, 768]	1153	[1556, 1557]	1856	[2161, 1368]	2559	[2683, 1701]
451	[769, 335]	1154	[318, 848]	1857	[2162, 2163]	2560	[2684, 841]
452	[770, 771]	1155	[945, 1558]	1858	[2164, 1344]	2561	[2685, 2198]
453	[772, 709]	1156	[1559, 351]	1859	[1288, 411]	2562	[285, 791]
454	[773, 774]	1157	[1560, 652]	1860	[2165, 145]	2563	[2686, 2459]
455	[775, 776]	1158	[1561, 1562]	1861	[2166, 1888]	2564	[719, 2371]
456	[777, 778]	1159	[1563, 299]	1862	[2167, 1209]	2565	[2322, 996]
457	[779, 68]	1160	[322, 1564]	1863	[2168, 1360]	2566	[2687, 2688]
458	[780, 264]	1161	[1565, 1566]	1864	[556, 1168]	2567	[2689, 963]
459	[781, 756]	1162	[1567, 1551]	1865	[2169, 475]	2568	[2690, 1487]
460	[782, 783]	1163	[1568, 1569]	1866	[636, 40]	2569	[2691, 2249]
461	[784, 27]	1164	[1570, 690]	1867	[2170, 1134]	2570	[2388, 1636]
462	[785, 786]	1165	[1571, 1572]	1868	[644, 402]	2571	[1510, 1651]
463	[787, 257]	1166	[1573, 1574]	1869	[1427, 419]	2572	[2692, 788]
464	[788, 789]	1167	[1575, 1044]	1870	[2128, 1226]	2573	[1776, 343]
465	[790, 252]	1168	[1576, 1577]	1871	[2171, 2072]	2574	[2693, 1605]
466	[791, 792]	1169	[1578, 281]	1872	[2172, 1315]	2575	[1001, 855]
467	[793, 643]	1170	[1500, 1579]	1873	[2173, 2174]	2576	[2694, 833]
468	[794, 795]	1171	[884, 1580]	1874	[2076, 1395]	2577	[287, 315]

469	[796, 797]	1172	[1581, 1582]	1875	[1397, 1273]	2578	[2695, 724]
470	[798, 799]	1173	[1583, 1584]	1876	[2175, 154]	2579	[2696, 347]
471	[800, 801]	1174	[1585, 1586]	1877	[2115, 1264]	2580	[84, 2328]
472	[802, 803]	1175	[1587, 1588]	1878	[2176, 406]	2581	[2697, 2229]
473	[804, 805]	1176	[367, 1467]	1879	[1318, 120]	2582	[2698, 967]
474	[806, 807]	1177	[1589, 985]	1880	[2177, 999]	2583	[1697, 2200]
475	[808, 667]	1178	[1590, 859]	1881	[2178, 2179]	2584	[2699, 1803]
476	[809, 225]	1179	[1591, 306]	1882	[2180, 2181]	2585	[2700, 2673]
477	[671, 810]	1180	[689, 942]	1883	[2182, 717]	2586	[2701, 2702]
478	[811, 812]	1181	[1592, 1593]	1884	[753, 830]	2587	[2703, 1728]
479	[813, 814]	1182	[1594, 858]	1885	[2183, 2184]	2588	[681, 2430]
480	[815, 94]	1183	[1584, 883]	1886	[2185, 229]	2589	[2704, 336]
481	[816, 817]	1184	[246, 1595]	1887	[2186, 1005]	2590	[2705, 82]
482	[818, 819]	1185	[1596, 1597]	1888	[2187, 1572]	2591	[959, 222]
483	[725, 820]	1186	[1598, 1599]	1889	[2188, 2189]	2592	[2706, 70]
484	[821, 822]	1187	[1600, 957]	1890	[2190, 2191]	2593	[685, 61]
485	[823, 824]	1188	[1601, 854]	1891	[2192, 2193]	2594	[2707, 2708]
486	[825, 60]	1189	[1602, 671]	1892	[2194, 873]	2595	[2709, 1844]
487	[826, 827]	1190	[1603, 958]	1893	[283, 915]	2596	[1810, 2388]
488	[828, 829]	1191	[1604, 1605]	1894	[2195, 1052]	2597	[2396, 661]
489	[830, 26]	1192	[1606, 917]	1895	[1782, 323]	2598	[2357, 910]
490	[831, 832]	1193	[933, 1441]	1896	[2196, 676]	2599	[2328, 63]
491	[833, 236]	1194	[1607, 755]	1897	[2197, 318]	2600	[2710, 2660]
492	[834, 835]	1195	[1608, 1609]	1898	[344, 2198]	2601	[2711, 794]
493	[836, 837]	1196	[1610, 1611]	1899	[2199, 2200]	2602	[2712, 695]
494	[838, 839]	1197	[1612, 343]	1900	[2201, 867]	2603	[2713, 56]
495	[71, 339]	1198	[1613, 729]	1901	[2179, 1816]	2604	[2714, 1022]
496	[840, 841]	1199	[1614, 1615]	1902	[1018, 2202]	2605	[2715, 2285]
497	[842, 843]	1200	[1616, 1015]	1903	[2203, 234]	2606	[2280, 253]
498	[844, 760]	1201	[752, 1617]	1904	[2204, 716]	2607	[2716, 2248]
499	[756, 845]	1202	[1618, 1619]	1905	[98, 2205]	2608	[1459, 1738]
500	[56, 846]	1203	[1620, 1621]	1906	[96, 954]	2609	[2717, 2718]
501	[847, 848]	1204	[1622, 972]	1907	[2206, 2207]	2610	[489, 1398]
502	[849, 79]	1205	[1623, 1624]	1908	[2208, 905]	2611	[1880, 119]
503	[850, 851]	1206	[250, 971]	1909	[2209, 839]	2612	[34, 39]
504	[350, 852]	1207	[1625, 1626]	1910	[1466, 937]	2613	[126, 576]
505	[853, 854]	1208	[1460, 247]	1911	[1624, 817]	2614	[1203, 437]
506	[855, 856]	1209	[1627, 918]	1912	[2210, 1514]	2615	[2719, 2135]
507	[857, 858]	1210	[1628, 1574]	1913	[2211, 1046]	2616	[2574, 2037]
508	[859, 860]	1211	[824, 1629]	1914	[2200, 1531]	2617	[433, 395]
509	[698, 683]	1212	[1630, 353]	1915	[2212, 1472]	2618	[2146, 199]
510	[861, 304]	1213	[897, 1631]	1916	[2213, 2214]	2619	[2608, 2720]
511	[862, 863]	1214	[1632, 1633]	1917	[2215, 2216]	2620	[2152, 1385]
512	[864, 865]	1215	[1634, 1030]	1918	[2217, 279]	2621	[2721, 1194]

513	[866, 867]	1216	[1635, 74]	1919	[2218, 1730]	2622	[2722, 648]
514	[281, 868]	1217	[1636, 1637]	1920	[2219, 2220]	2623	[131, 634]
515	[869, 870]	1218	[980, 1638]	1921	[1657, 1456]	2624	[2517, 1179]
516	[871, 872]	1219	[819, 1472]	1922	[2191, 2221]	2625	[2004, 1389]
517	[839, 873]	1220	[1639, 800]	1923	[951, 376]	2626	[2723, 2524]
518	[854, 874]	1221	[1640, 904]	1924	[747, 2222]	2627	[487, 407]
519	[100, 307]	1222	[1641, 1642]	1925	[2193, 1678]	2628	[2724, 1263]
520	[875, 876]	1223	[1643, 802]	1926	[2223, 1684]	2629	[2725, 2064]
521	[877, 878]	1224	[1644, 1645]	1927	[2224, 789]	2630	[1401, 523]
522	[879, 677]	1225	[1646, 684]	1928	[1003, 958]	2631	[2173, 1281]
523	[880, 881]	1226	[1647, 1648]	1929	[2225, 2226]	2632	[456, 506]
524	[882, 18]	1227	[730, 1621]	1930	[2227, 324]	2633	[2490, 480]
525	[883, 884]	1228	[1649, 1650]	1931	[801, 2228]	2634	[2726, 446]
526	[885, 886]	1229	[1651, 262]	1932	[2229, 1512]	2635	[2500, 2022]
527	[887, 782]	1230	[1652, 1653]	1933	[2230, 99]	2636	[590, 488]
528	[888, 889]	1231	[1654, 289]	1934	[1444, 2231]	2637	[2727, 1215]
529	[890, 891]	1232	[1655, 236]	1935	[2232, 2233]	2638	[483, 634]
530	[892, 851]	1233	[1656, 1493]	1936	[2234, 1751]	2639	[1120, 11]
531	[893, 708]	1234	[858, 1657]	1937	[2235, 2236]	2640	[1284, 585]
532	[894, 895]	1235	[1465, 1658]	1938	[2237, 1763]	2641	[2542, 182]
533	[896, 897]	1236	[1659, 71]	1939	[868, 17]	2642	[1368, 1129]
534	[898, 899]	1237	[1660, 310]	1940	[2238, 704]	2643	[2728, 2524]
535	[900, 901]	1238	[1661, 88]	1941	[2239, 1042]	2644	[2729, 532]
536	[902, 346]	1239	[1662, 1663]	1942	[2240, 2239]	2645	[1432, 1417]
537	[903, 860]	1240	[1664, 1665]	1943	[723, 1506]	2646	[2730, 2019]
538	[904, 775]	1241	[1666, 1667]	1944	[1538, 970]	2647	[2723, 2720]
539	[905, 778]	1242	[1668, 1532]	1945	[2241, 362]	2648	[2731, 1125]
540	[906, 907]	1243	[865, 1547]	1946	[760, 850]	2649	[2065, 2563]
541	[908, 770]	1244	[1669, 232]	1947	[2242, 1018]	2650	[2732, 532]
542	[909, 798]	1245	[306, 788]	1948	[1439, 2243]	2651	[1258, 386]
543	[910, 911]	1246	[1670, 206]	1949	[2244, 1623]	2652	[2733, 2026]
544	[912, 889]	1247	[962, 1671]	1950	[2245, 1013]	2653	[2734, 53]
545	[817, 242]	1248	[1672, 240]	1951	[2246, 2247]	2654	[2009, 591]
546	[913, 914]	1249	[1673, 1584]	1952	[2248, 2249]	2655	[2735, 192]
547	[915, 916]	1250	[1674, 1675]	1953	[2250, 2251]	2656	[198, 1351]
548	[917, 918]	1251	[1676, 86]	1954	[2252, 722]	2657	[2520, 1969]
549	[658, 786]	1252	[1677, 1678]	1955	[2253, 1623]	2658	[2153, 603]
550	[732, 919]	1253	[1679, 925]	1956	[2254, 2255]	2659	[1977, 493]
551	[920, 63]	1254	[201, 1560]	1957	[2256, 2257]	2660	[1246, 107]
552	[921, 922]	1255	[1680, 1681]	1958	[2258, 2195]	2661	[2736, 2142]
553	[923, 283]	1256	[1682, 297]	1959	[104, 321]	2662	[2550, 2563]
554	[924, 752]	1257	[1683, 710]	1960	[2259, 1597]	2663	[2737, 2718]
555	[203, 925]	1258	[1684, 1489]	1961	[255, 328]	2664	[501, 630]
556	[926, 927]	1259	[803, 1685]	1962	[749, 2260]	2665	[2738, 556]

557	[928, 929]	1260	[1686, 825]	1963	[2261, 1016]	2666	[2573, 1995]
558	[365, 930]	1261	[1687, 1688]	1964	[2262, 1592]	2667	[1167, 557]
559	[867, 931]	1262	[1689, 1690]	1965	[1456, 1788]	2668	[1896, 2131]
560	[932, 933]	1263	[1691, 740]	1966	[2263, 204]	2669	[2739, 1078]
561	[934, 58]	1264	[1481, 74]	1967	[2264, 2265]	2670	[2516, 174]
562	[935, 907]	1265	[310, 1452]	1968	[2266, 967]	2671	[2545, 2563]
563	[936, 937]	1266	[1692, 711]	1969	[2267, 2268]	2672	[2740, 1885]
564	[938, 728]	1267	[1693, 348]	1970	[339, 290]	2673	[1243, 579]
565	[939, 896]	1268	[1658, 1694]	1971	[2269, 2270]	2674	[2729, 152]
566	[940, 941]	1269	[1695, 1696]	1972	[2271, 2272]	2675	[1263, 379]
567	[942, 943]	1270	[972, 1697]	1973	[2273, 1463]	2676	[2741, 1263]
568	[944, 945]	1271	[1698, 962]	1974	[1839, 1718]	2677	[2503, 1145]
569	[270, 838]	1272	[653, 1478]	1975	[2274, 201]	2678	[2742, 1350]
570	[946, 947]	1273	[77, 1699]	1976	[2275, 2276]	2679	[1210, 502]
571	[948, 801]	1274	[1700, 1701]	1977	[2277, 373]	2680	[2743, 1926]
572	[949, 950]	1275	[1702, 1703]	1978	[2278, 273]	2681	[1394, 413]
573	[17, 951]	1276	[1685, 721]	1979	[2279, 2280]	2682	[2744, 2511]
574	[952, 803]	1277	[1704, 250]	1980	[2281, 2282]	2683	[2745, 1210]
575	[953, 716]	1278	[1705, 1706]	1981	[2283, 791]	2684	[2746, 1907]
576	[954, 955]	1279	[279, 1707]	1982	[2284, 2285]	2685	[2747, 1070]
577	[956, 957]	1280	[1708, 1486]	1983	[1703, 935]	2686	[2523, 2720]
578	[958, 959]	1281	[1709, 1710]	1984	[2286, 2287]	2687	[2748, 2174]
579	[792, 960]	1282	[369, 228]	1985	[2288, 653]	2688	[473, 1205]
580	[961, 962]	1283	[1711, 971]	1986	[2289, 2205]	2689	[2164, 1108]
581	[963, 964]	1284	[1712, 1696]	1987	[2290, 2291]	2690	[2749, 2484]
582	[965, 966]	1285	[1577, 825]	1988	[2292, 824]	2691	[2169, 457]
583	[967, 968]	1286	[901, 859]	1989	[2293, 949]	2692	[412, 1395]
584	[969, 970]	1287	[1713, 654]	1990	[2294, 910]	2693	[629, 502]
585	[971, 972]	1288	[1714, 1479]	1991	[2295, 2296]	2694	[2750, 445]
586	[225, 973]	1289	[916, 1674]	1992	[2297, 1452]	2695	[2541, 2484]
587	[974, 893]	1290	[1715, 864]	1993	[2298, 2299]	2696	[2751, 613]
588	[975, 976]	1291	[324, 231]	1994	[683, 1799]	2697	[2508, 1920]
589	[977, 966]	1292	[1716, 23]	1995	[2300, 2301]	2698	[2752, 1363]
590	[978, 95]	1293	[325, 1717]	1996	[738, 2302]	2699	[2753, 421]
591	[979, 980]	1294	[1718, 818]	1997	[2303, 2304]	2700	[2754, 2566]
592	[981, 4]	1295	[1719, 1644]	1998	[2305, 354]	2701	[2755, 152]
593	[982, 102]	1296	[1720, 1721]	1999	[810, 963]	2702	[1323, 37]
594	[102, 983]	1297	[1722, 942]	2000	[2306, 1005]	2703	[2575, 190]
595	[984, 985]	1298	[1723, 1724]	2001	[2307, 1443]	2704	[1146, 597]
596	[786, 986]	1299	[1725, 1726]	2002	[2308, 2309]	2705	[2756, 2594]
597	[987, 988]	1300	[1727, 1046]	2003	[2310, 983]	2706	[2749, 2022]
598	[989, 990]	1301	[1728, 1729]	2004	[2311, 945]	2707	[2130, 1415]
599	[991, 992]	1302	[1645, 1730]	2005	[2312, 2313]	2708	[1961, 549]
600	[993, 984]	1303	[1731, 1490]	2006	[2314, 980]	2709	[1066, 420]

601	[994, 995]	1304	[1732, 1708]	2007	[2315, 828]	2710	[2757, 7]
602	[996, 997]	1305	[1733, 265]	2008	[2316, 2317]	2711	[2176, 1209]
603	[998, 323]	1306	[1734, 246]	2009	[2318, 661]	2712	[2758, 2586]
604	[999, 840]	1307	[1735, 1694]	2010	[856, 664]	2713	[1335, 1201]
605	[1000, 1001]	1308	[1605, 1736]	2011	[2319, 2320]	2714	[2759, 2160]
606	[1002, 1003]	1309	[1737, 1738]	2012	[2321, 2322]	2715	[2760, 1105]
607	[1004, 747]	1310	[1739, 203]	2013	[907, 2323]	2716	[1919, 2509]
608	[1005, 1006]	1311	[1740, 810]	2014	[2324, 1776]	2717	[2761, 2376]
609	[1007, 1008]	1312	[1741, 1742]	2015	[2325, 1593]	2718	[2762, 2261]
610	[1009, 358]	1313	[1743, 884]	2016	[2326, 2217]	2719	[2763, 1008]
611	[1010, 92]	1314	[1744, 1601]	2017	[2327, 2328]	2720	[2764, 2765]
612	[1008, 1011]	1315	[1745, 1746]	2018	[1663, 332]	2721	[2766, 2357]
613	[1012, 658]	1316	[1747, 989]	2019	[2329, 735]	2722	[918, 1644]
614	[1013, 827]	1317	[1748, 1749]	2020	[2330, 315]	2723	[679, 1728]
615	[1014, 1015]	1318	[1750, 282]	2021	[320, 836]	2724	[2767, 718]
616	[1016, 1017]	1319	[1751, 266]	2022	[2331, 1838]	2725	[778, 880]
617	[1015, 1018]	1320	[1752, 72]	2023	[2332, 2333]	2726	[2768, 2312]
618	[1017, 353]	1321	[1753, 1754]	2024	[763, 1562]	2727	[2769, 367]
619	[1019, 1020]	1322	[1755, 98]	2025	[2334, 273]	2728	[1690, 762]
620	[1021, 1022]	1323	[955, 843]	2026	[2335, 2336]	2729	[2770, 2614]
621	[1023, 1020]	1324	[1756, 205]	2027	[2337, 274]	2730	[62, 2369]
622	[1024, 832]	1325	[1757, 270]	2028	[937, 2259]	2731	[2771, 2465]
623	[889, 1025]	1326	[1543, 1758]	2029	[2338, 312]	2732	[2772, 290]
624	[1026, 689]	1327	[1759, 1760]	2030	[291, 992]	2733	[783, 2656]
625	[1027, 1028]	1328	[1761, 1762]	2031	[992, 812]	2734	[2773, 1486]
626	[1029, 1030]	1329	[23, 1763]	2032	[2339, 762]	2735	[2774, 2444]
627	[1031, 806]	1330	[27, 944]	2033	[2340, 1035]	2736	[2775, 782]
628	[1032, 1033]	1331	[1764, 1476]	2034	[2341, 996]	2737	[710, 949]
629	[1034, 838]	1332	[1765, 1766]	2035	[2342, 698]	2738	[2776, 928]
630	[1035, 798]	1333	[997, 732]	2036	[2343, 1804]	2739	[2777, 2350]
631	[1036, 935]	1334	[1557, 89]	2037	[2344, 664]	2740	[2630, 2625]
632	[1037, 349]	1335	[1767, 77]	2038	[2345, 2323]	2741	[2778, 2272]
633	[1038, 729]	1336	[1768, 1667]	2039	[2346, 2347]	2742	[673, 1770]
634	[677, 862]	1337	[1769, 1770]	2040	[2348, 269]	2743	[2385, 214]
635	[1039, 1040]	1338	[1771, 1595]	2041	[2349, 2350]	2744	[2779, 1754]
636	[1041, 1042]	1339	[1772, 204]	2042	[1653, 1774]	2745	[2780, 2202]
637	[829, 293]	1340	[1773, 1774]	2043	[2351, 2352]	2746	[1566, 301]
638	[1043, 1044]	1341	[1775, 749]	2044	[2353, 376]	2747	[2781, 736]
639	[995, 213]	1342	[277, 1523]	2045	[1678, 669]	2748	[2255, 103]
640	[1045, 835]	1343	[1642, 1776]	2046	[2354, 880]	2749	[814, 2397]
641	[1046, 314]	1344	[1777, 87]	2047	[2236, 356]	2750	[2782, 243]
642	[1047, 1048]	1345	[1504, 1778]	2048	[217, 2355]	2751	[2783, 1013]
643	[643, 643]	1346	[1779, 1780]	2049	[2356, 2357]	2752	[348, 1796]
644	[1040, 690]	1347	[75, 206]	2050	[2222, 2334]	2753	[700, 2191]

645	[1049, 1050]	1348	[667, 684]	2051	[2358, 1785]	2754	[1631, 1592]
646	[1051, 1052]	1349	[919, 745]	2052	[988, 1780]	2755	[2784, 896]
647	[1053, 1054]	1350	[1781, 1718]	2053	[1717, 976]	2756	[2785, 2322]
648	[1055, 359]	1351	[1052, 1782]	2054	[2359, 2360]	2757	[2786, 2416]
649	[209, 1056]	1352	[1783, 820]	2055	[1474, 876]	2758	[2787, 64]
650	[1057, 1058]	1353	[1784, 325]	2056	[2361, 1467]	2759	[758, 1474]
651	[610, 612]	1354	[1785, 1453]	2057	[2362, 222]	2760	[1523, 2366]
652	[380, 171]	1355	[1786, 1048]	2058	[2363, 865]	2761	[132, 1111]
653	[405, 168]	1356	[1787, 1788]	2059	[2364, 1004]	2762	[1414, 2131]
654	[1059, 482]	1357	[1789, 1790]	2060	[2365, 2366]	2763	[1159, 514]
655	[1060, 406]	1358	[1791, 691]	2061	[2367, 1442]	2764	[2728, 2720]
656	[522, 1061]	1359	[845, 84]	2062	[2368, 2369]	2765	[41, 543]
657	[1062, 1063]	1360	[1792, 1753]	2063	[2370, 2371]	2766	[438, 463]
658	[1064, 1065]	1361	[1793, 818]	2064	[2372, 251]	2767	[1908, 1125]
659	[1066, 379]	1362	[1794, 1513]	2065	[1650, 1576]	2768	[2553, 1412]
660	[1067, 1068]	1363	[1795, 25]	2066	[2373, 2374]	2769	[2788, 1897]
661	[1069, 506]	1364	[1796, 1797]	2067	[2375, 2376]	2770	[2789, 1241]
662	[1070, 157]	1365	[1798, 1799]	2068	[2347, 362]	2771	[2161, 1284]
663	[588, 531]	1366	[1800, 711]	2069	[2377, 2378]	2772	[2755, 532]
664	[1071, 1072]	1367	[1801, 885]	2070	[2379, 733]	2773	[2530, 1147]
665	[491, 1073]	1368	[1802, 1538]	2071	[2380, 374]	2774	[2790, 163]
666	[596, 432]	1369	[1803, 1804]	2072	[2381, 2382]	2775	[634, 426]
667	[1074, 472]	1370	[1805, 331]	2073	[891, 905]	2776	[2791, 1332]
668	[1075, 575]	1371	[92, 1806]	2074	[2383, 1739]	2777	[1292, 1293]
669	[1076, 519]	1372	[1807, 862]	2075	[2384, 1811]	2778	[2792, 1215]
670	[1077, 1078]	1373	[1808, 855]	2076	[914, 2385]	2779	[2793, 2592]
671	[138, 1079]	1374	[1809, 1810]	2077	[2386, 1453]	2780	[2559, 480]
672	[1080, 1081]	1375	[252, 1811]	2078	[297, 718]	2781	[2794, 490]
673	[1082, 1083]	1376	[1812, 1615]	2079	[1726, 659]	2782	[2090, 457]
674	[1084, 1085]	1377	[1813, 927]	2080	[2387, 2388]	2783	[2795, 1241]
675	[1086, 1087]	1378	[1814, 693]	2081	[2389, 1001]	2784	[2796, 1306]
676	[1088, 483]	1379	[1815, 1816]	2082	[2390, 1504]	2785	[562, 39]
677	[1089, 1072]	1380	[1817, 1818]	2083	[2391, 2392]	2786	[2600, 1368]
678	[389, 35]	1381	[1819, 822]	2084	[2393, 1446]	2787	[2748, 1281]
679	[1067, 586]	1382	[1820, 1821]	2085	[1770, 2394]	2788	[2797, 944]
680	[1090, 1091]	1383	[1822, 264]	2086	[2395, 2396]	2789	[2798, 1760]
681	[1092, 197]	1384	[1823, 1824]	2087	[1780, 2320]	2790	[2799, 2302]
682	[1093, 1094]	1385	[1825, 1826]	2088	[2397, 2287]	2791	[2453, 806]
683	[455, 623]	1386	[86, 849]	2089	[1738, 1751]	2792	[2800, 1671]
684	[1095, 558]	1387	[1827, 372]	2090	[2398, 780]	2793	[2350, 2226]
685	[472, 1096]	1388	[289, 1818]	2091	[2399, 1658]	2794	[2801, 899]
686	[575, 112]	1389	[812, 1828]	2092	[2400, 2401]	2795	[2802, 745]
687	[1097, 457]	1390	[1633, 243]	2093	[2402, 2247]	2796	[2803, 849]
688	[123, 483]	1391	[1829, 1830]	2094	[665, 933]	2797	[2494, 1284]

689	[1098, 196]	1392	[1831, 1582]	2095	[341, 780]	2798	[2804, 1306]
690	[594, 594]	1393	[1832, 1833]	2096	[261, 18]	2799	[2805, 51]
691	[1099, 1100]	1394	[1834, 1566]	2097	[2226, 2403]	2800	[2731, 1187]
692	[1101, 503]	1395	[1835, 1836]	2098	[2404, 1674]	2801	[2569, 591]
693	[1058, 179]	1396	[1837, 19]	2099	[2405, 2257]	2802	[2579, 182]
694	[1102, 1103]	1397	[1838, 66]	2100	[1762, 359]	2803	[2732, 152]
695	[603, 120]	1398	[925, 1839]	2101	[337, 675]	2804	[2806, 766]
696	[380, 13]	1399	[1840, 725]	2102	[2406, 2256]	2805	[2807, 2618]
697	[1104, 1105]	1400	[1841, 1443]	2103	[2407, 326]	2806	[2808, 613]
698	[164, 1106]	1401	[1842, 235]	2104	[2408, 2313]	2807	[2099, 507]
699	[1107, 1108]	1402	[1843, 1844]	2105	[2409, 2385]	2808	[2809, 712]
700	[537, 428]	1403	[1845, 999]	2106	[2410, 2221]	2809	[2501, 532]
701	[1109, 53]	1404	[1846, 1847]	2107	[2378, 676]		
702	[122, 1110]	1405	[1848, 61]	2108	[2411, 365]		

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	469	0	938	0	1407	1	1876	1	2345	0
1	0	470	1	939	1	1408	0	1877	0	2346	0
2	0	471	1	940	1	1409	1	1878	0	2347	0
3	0	472	1	941	1	1410	1	1879	1	2348	0
4	0	473	0	942	1	1411	1	1880	0	2349	1
5	0	474	1	943	1	1412	0	1881	0	2350	0
6	1	475	1	944	0	1413	0	1882	1	2351	1
7	0	476	0	945	1	1414	1	1883	0	2352	0
8	0	477	0	946	0	1415	1	1884	1	2353	1
9	1	478	1	947	1	1416	0	1885	1	2354	1
10	0	479	1	948	0	1417	0	1886	1	2355	0
11	1	480	1	949	1	1418	0	1887	1	2356	0
12	1	481	1	950	1	1419	0	1888	0	2357	0
13	1	482	0	951	0	1420	1	1889	1	2358	0
14	0	483	0	952	0	1421	1	1890	0	2359	0
15	1	484	1	953	1	1422	1	1891	1	2360	1
16	0	485	0	954	1	1423	1	1892	1	2361	0
17	1	486	0	955	0	1424	1	1893	0	2362	0
18	1	487	0	956	1	1425	0	1894	0	2363	1
19	1	488	0	957	1	1426	0	1895	0	2364	1
20	0	489	1	958	0	1427	0	1896	1	2365	1
21	0	490	0	959	1	1428	1	1897	0	2366	1
22	1	491	1	960	0	1429	0	1898	0	2367	0
23	1	492	0	961	0	1430	0	1899	1	2368	1
24	1	493	0	962	0	1431	1	1900	1	2369	1
25	0	494	1	963	0	1432	0	1901	1	2370	0
26	1	495	1	964	0	1433	1	1902	0	2371	1

27	1	496	1	965	1	1434	0	1903	1	2372	1
28	0	497	1	966	1	1435	1	1904	0	2373	1
29	1	498	0	967	0	1436	0	1905	1	2374	1
30	1	499	0	968	0	1437	0	1906	1	2375	1
31	1	500	0	969	1	1438	0	1907	1	2376	1
32	0	501	1	970	0	1439	0	1908	0	2377	1
33	0	502	1	971	0	1440	1	1909	0	2378	0
34	1	503	0	972	0	1441	1	1910	1	2379	1
35	1	504	0	973	0	1442	0	1911	0	2380	0
36	1	505	1	974	0	1443	0	1912	1	2381	0
37	0	506	0	975	1	1444	1	1913	0	2382	1
38	1	507	0	976	1	1445	1	1914	0	2383	1
39	0	508	0	977	0	1446	0	1915	1	2384	0
40	0	509	0	978	1	1447	0	1916	0	2385	1
41	0	510	0	979	1	1448	1	1917	1	2386	0
42	0	511	0	980	1	1449	1	1918	1	2387	1
43	1	512	0	981	1	1450	0	1919	0	2388	0
44	1	513	0	982	0	1451	1	1920	0	2389	1
45	1	514	0	983	1	1452	1	1921	1	2390	1
46	1	515	0	984	1	1453	0	1922	0	2391	1
47	1	516	0	985	1	1454	1	1923	0	2392	1
48	0	517	0	986	1	1455	0	1924	1	2393	0
49	0	518	1	987	0	1456	1	1925	0	2394	1
50	0	519	0	988	1	1457	0	1926	0	2395	0
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52	1	521	0	990	0	1459	0	1928	0	2397	1
53	1	522	1	991	0	1460	0	1929	1	2398	0
54	1	523	1	992	0	1461	0	1930	0	2399	1
55	0	524	1	993	0	1462	0	1931	0	2400	0
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57	1	526	0	995	0	1464	1	1933	0	2402	0
58	1	527	0	996	1	1465	0	1934	1	2403	0
59	1	528	1	997	1	1466	1	1935	1	2404	0
60	0	529	0	998	1	1467	0	1936	1	2405	1
61	1	530	1	999	0	1468	0	1937	1	2406	0
62	0	531	1	1000	0	1469	1	1938	0	2407	0
63	0	532	1	1001	0	1470	1	1939	1	2408	0
64	1	533	0	1002	0	1471	1	1940	0	2409	1
65	0	534	0	1003	0	1472	0	1941	0	2410	1
66	0	535	0	1004	1	1473	1	1942	0	2411	1
67	1	536	1	1005	0	1474	1	1943	1	2412	1
68	1	537	1	1006	0	1475	0	1944	0	2413	0
69	0	538	0	1007	0	1476	0	1945	1	2414	1
70	1	539	1	1008	0	1477	1	1946	0	2415	1

71	1	540	1	1009	0	1478	0	1947	0	2416	0
72	0	541	1	1010	1	1479	0	1948	0	2417	0
73	1	542	1	1011	0	1480	1	1949	0	2418	1
74	1	543	1	1012	0	1481	0	1950	1	2419	1
75	1	544	0	1013	1	1482	0	1951	1	2420	0
76	0	545	1	1014	0	1483	0	1952	0	2421	1
77	0	546	1	1015	1	1484	1	1953	1	2422	1
78	0	547	0	1016	0	1485	0	1954	1	2423	0
79	0	548	1	1017	0	1486	1	1955	1	2424	1
80	0	549	1	1018	0	1487	0	1956	1	2425	0
81	1	550	1	1019	0	1488	1	1957	0	2426	1
82	1	551	1	1020	0	1489	1	1958	0	2427	1
83	1	552	0	1021	1	1490	0	1959	1	2428	1
84	0	553	1	1022	1	1491	0	1960	1	2429	0
85	1	554	0	1023	1	1492	0	1961	0	2430	0
86	1	555	1	1024	1	1493	0	1962	1	2431	0
87	1	556	1	1025	1	1494	1	1963	0	2432	0
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89	1	558	0	1027	1	1496	1	1965	1	2434	1
90	0	559	1	1028	0	1497	0	1966	1	2435	0
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92	1	561	0	1030	1	1499	1	1968	1	2437	0
93	0	562	0	1031	1	1500	1	1969	0	2438	0
94	0	563	0	1032	0	1501	0	1970	1	2439	1
95	0	564	0	1033	0	1502	1	1971	0	2440	1
96	1	565	1	1034	0	1503	0	1972	0	2441	0
97	1	566	1	1035	0	1504	1	1973	1	2442	1
98	1	567	1	1036	1	1505	0	1974	1	2443	0
99	1	568	0	1037	0	1506	0	1975	1	2444	0
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102	1	571	0	1040	0	1509	1	1978	0	2447	1
103	1	572	1	1041	1	1510	1	1979	0	2448	1
104	1	573	1	1042	0	1511	0	1980	1	2449	1
105	0	574	0	1043	1	1512	0	1981	0	2450	0
106	1	575	1	1044	0	1513	0	1982	1	2451	0
107	0	576	1	1045	1	1514	0	1983	0	2452	0
108	0	577	1	1046	0	1515	1	1984	0	2453	0
109	1	578	0	1047	1	1516	0	1985	1	2454	0
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111	1	580	0	1049	1	1518	0	1987	1	2456	0
112	0	581	0	1050	0	1519	1	1988	1	2457	0
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115	0	584	1	1053	0	1522	1	1991	1	2460	0
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117	1	586	1	1055	1	1524	1	1993	1	2462	1
118	1	587	0	1056	0	1525	1	1994	0	2463	0
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123	1	592	1	1061	0	1530	0	1999	1	2468	0
124	1	593	0	1062	1	1531	1	2000	0	2469	0
125	0	594	1	1063	0	1532	0	2001	1	2470	1
126	0	595	1	1064	1	1533	1	2002	0	2471	0
127	0	596	0	1065	1	1534	1	2003	0	2472	1
128	0	597	0	1066	1	1535	0	2004	1	2473	0
129	1	598	0	1067	1	1536	0	2005	1	2474	0
130	0	599	0	1068	0	1537	1	2006	0	2475	1
131	1	600	0	1069	0	1538	0	2007	1	2476	0
132	0	601	1	1070	0	1539	1	2008	0	2477	1
133	0	602	1	1071	0	1540	0	2009	0	2478	1
134	1	603	1	1072	0	1541	0	2010	0	2479	1
135	1	604	0	1073	1	1542	0	2011	0	2480	0
136	1	605	0	1074	0	1543	0	2012	1	2481	1
137	1	606	0	1075	0	1544	1	2013	1	2482	1
138	0	607	1	1076	0	1545	1	2014	1	2483	1
139	0	608	0	1077	1	1546	0	2015	0	2484	1
140	1	609	0	1078	1	1547	1	2016	1	2485	0
141	1	610	0	1079	1	1548	1	2017	1	2486	0
142	1	611	1	1080	0	1549	1	2018	1	2487	1
143	1	612	0	1081	0	1550	0	2019	0	2488	1
144	1	613	0	1082	1	1551	1	2020	0	2489	1
145	0	614	1	1083	0	1552	1	2021	1	2490	0
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149	0	618	0	1087	0	1556	1	2025	1	2494	0
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151	1	620	1	1089	1	1558	0	2027	0	2496	1
152	0	621	1	1090	1	1559	0	2028	1	2497	0
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155	1	624	1	1093	1	1562	1	2031	0	2500	1
156	1	625	1	1094	1	1563	1	2032	0	2501	1
157	1	626	0	1095	0	1564	0	2033	1	2502	0
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159	1	628	0	1097	0	1566	0	2035	0	2504	1
160	1	629	0	1098	0	1567	1	2036	0	2505	1
161	0	630	0	1099	0	1568	1	2037	1	2506	0
162	1	631	1	1100	1	1569	1	2038	0	2507	0
163	1	632	0	1101	0	1570	1	2039	0	2508	1
164	0	633	0	1102	1	1571	1	2040	0	2509	1
165	1	634	1	1103	0	1572	1	2041	1	2510	1
166	0	635	1	1104	1	1573	0	2042	0	2511	0
167	1	636	1	1105	0	1574	1	2043	1	2512	0
168	0	637	1	1106	1	1575	0	2044	1	2513	1
169	0	638	1	1107	0	1576	1	2045	0	2514	1
170	1	639	0	1108	0	1577	1	2046	1	2515	1
171	0	640	1	1109	0	1578	1	2047	0	2516	0
172	0	641	0	1110	1	1579	1	2048	0	2517	1
173	1	642	1	1111	1	1580	1	2049	0	2518	1
174	0	643	0	1112	1	1581	1	2050	1	2519	0
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176	1	645	1	1114	0	1583	0	2052	1	2521	0
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178	0	647	0	1116	1	1585	0	2054	0	2523	0
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181	1	650	0	1119	1	1588	0	2057	0	2526	1
182	0	651	0	1120	0	1589	0	2058	1	2527	1
183	1	652	0	1121	1	1590	0	2059	1	2528	1
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195	1	664	0	1133	1	1602	0	2071	0	2540	1
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202	1	671	0	1140	0	1609	1	2078	1	2547	0

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222	1	691	0	1160	1	1629	0	2098	0	2567	0
223	1	692	0	1161	1	1630	1	2099	1	2568	0
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233	1	702	1	1171	0	1640	1	2109	1	2578	0
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237	0	706	0	1175	0	1644	0	2113	1	2582	0
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240	0	709	0	1178	0	1647	1	2116	0	2585	0
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243	0	712	1	1181	1	1650	1	2119	0	2588	1
244	0	713	0	1182	1	1651	1	2120	1	2589	0
245	1	714	1	1183	0	1652	0	2121	0	2590	0
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249	1	718	1	1187	0	1656	1	2125	0	2594	0
250	1	719	1	1188	0	1657	1	2126	0	2595	1
251	0	720	1	1189	0	1658	1	2127	1	2596	0
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253	0	722	0	1191	1	1660	0	2129	1	2598	0
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256	1	725	0	1194	0	1663	1	2132	1	2601	0
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258	1	727	1	1196	1	1665	0	2134	0	2603	1
259	0	728	1	1197	0	1666	1	2135	0	2604	0
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261	0	730	0	1199	0	1668	0	2137	0	2606	1
262	0	731	0	1200	1	1669	1	2138	0	2607	0
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265	0	734	1	1203	1	1672	1	2141	0	2610	1
266	1	735	0	1204	1	1673	1	2142	1	2611	0
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268	1	737	0	1206	1	1675	1	2144	0	2613	0
269	0	738	0	1207	0	1676	0	2145	0	2614	1
270	1	739	0	1208	0	1677	1	2146	1	2615	1
271	1	740	0	1209	0	1678	0	2147	0	2616	0
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273	1	742	1	1211	0	1680	1	2149	0	2618	1
274	0	743	1	1212	1	1681	0	2150	1	2619	0
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276	0	745	0	1214	0	1683	1	2152	1	2621	1
277	0	746	0	1215	1	1684	0	2153	0	2622	0
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279	0	748	1	1217	1	1686	0	2155	1	2624	1
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296	1	765	0	1234	1	1703	0	2172	0	2641	1
297	1	766	1	1235	0	1704	0	2173	1	2642	0
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300	1	769	0	1238	0	1707	1	2176	0	2645	0
301	1	770	1	1239	0	1708	0	2177	0	2646	0
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303	1	772	0	1241	1	1710	1	2179	1	2648	1
304	1	773	1	1242	0	1711	0	2180	1	2649	1
305	0	774	1	1243	1	1712	1	2181	0	2650	0
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307	1	776	1	1245	0	1714	1	2183	1	2652	0
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309	1	778	0	1247	0	1716	0	2185	1	2654	0
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311	0	780	1	1249	1	1718	0	2187	0	2656	1
312	0	781	1	1250	0	1719	1	2188	1	2657	1
313	1	782	1	1251	0	1720	1	2189	0	2658	0
314	1	783	0	1252	1	1721	0	2190	0	2659	0
315	0	784	0	1253	0	1722	1	2191	0	2660	0
316	0	785	0	1254	0	1723	0	2192	1	2661	1
317	1	786	0	1255	1	1724	1	2193	0	2662	0
318	0	787	0	1256	0	1725	0	2194	1	2663	1
319	0	788	1	1257	1	1726	0	2195	0	2664	1
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322	1	791	1	1260	0	1729	1	2198	0	2667	0
323	1	792	1	1261	1	1730	1	2199	1	2668	1
324	1	793	1	1262	1	1731	1	2200	0	2669	0
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326	0	795	0	1264	0	1733	1	2202	0	2671	0
327	1	796	0	1265	0	1734	0	2203	1	2672	0
328	1	797	0	1266	1	1735	0	2204	0	2673	1
329	0	798	1	1267	0	1736	1	2205	0	2674	1
330	0	799	0	1268	1	1737	1	2206	1	2675	1
331	0	800	1	1269	0	1738	0	2207	1	2676	1
332	1	801	0	1270	0	1739	0	2208	0	2677	0
333	1	802	1	1271	1	1740	1	2209	0	2678	1
334	1	803	1	1272	0	1741	1	2210	1	2679	1

335	0	804	0	1273	0	1742	0	2211	0	2680	1
336	1	805	1	1274	0	1743	0	2212	1	2681	0
337	0	806	1	1275	1	1744	1	2213	0	2682	0
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341	1	810	1	1279	0	1748	0	2217	1	2686	0
342	0	811	1	1280	0	1749	1	2218	0	2687	1
343	1	812	1	1281	1	1750	1	2219	0	2688	0
344	0	813	1	1282	1	1751	0	2220	1	2689	0
345	0	814	0	1283	0	1752	0	2221	0	2690	0
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347	1	816	1	1285	1	1754	0	2223	0	2692	1
348	0	817	1	1286	1	1755	0	2224	0	2693	0
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355	1	824	0	1293	0	1762	0	2231	1	2700	0
356	1	825	0	1294	0	1763	0	2232	1	2701	0
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359	0	828	0	1297	1	1766	0	2235	1	2704	0
360	1	829	1	1298	0	1767	1	2236	0	2705	0
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463	0	932	0	1401	0	1870	1	2339	0	2808	1
464	1	933	1	1402	0	1871	0	2340	1	2809	1
465	1	934	0	1403	1	1872	0	2341	0		
466	1	935	0	1404	1	1873	1	2342	0		

467	1	936	0	1405	0	1874	0	2343	0		
468	0	937	1	1406	0	1875	1	2344	1		

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