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

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

1. Introduction

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

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

as the limit of the finite continued fractions

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

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

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

admits a continued fraction expansion of form (1.1).

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

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

that we shall denote

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

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

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

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

$$\begin{aligned}
p_0(z)&=z^{16}+z^{15}+z^{13}+z^{12}+z^{11}+z^9+z^6+z^5+1,\\
p_1(z)&=z^{19}+z^{18}+z^{16}+z^{13}+z^{12}+z^8+z^6+z^4+z^3+z^2,\\
p_2(z)&=z^{20}+z^{18}+z^{16}+z^{14}+z^8+z^6+z^4+1,\\
p_3(z)&=z^{19}+z^{18}+z^{16}+z^{13}+z^{12}+z^8+z^6+z^4+z^3+z^2,\\
p_4(z)&=z^{18}+z^{16}+z^{15}+z^{14}+z^{13}+z^{11}+z^9+z^5+z^4+1,
\end{aligned}$$

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

$$\begin{aligned}
p_0(z)&=z^{15}+z^{13}+z^{11}+z^9+z^8+z^6+z^5+1,\\
p_1(z)&=z^{19}+z^{18}+z^{16}+z^{13}+z^{12}+z^8+z^6+z^4+z^3+z^2,\\
p_2(z)&=z^{20}+z^{18}+z^{16}+z^{14}+z^8+z^6+z^4+1,\\
p_3(z)&=z^{19}+z^{18}+z^{16}+z^{13}+z^{12}+z^8+z^6+z^4+z^3+z^2,\\
p_4(z)&=z^{18}+z^{15}+z^{14}+z^{13}+z^{12}+z^{11}+z^9+z^8+z^5+z^4+1.
\end{aligned}$$

2. Proof

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

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

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

$$(125, 125, 125, 125, 125)$$

of the vector

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

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

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

Lemma 2.1. *We have*

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

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

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

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

Proof. We give the proof of the identity

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

the proofs of the others being similar.

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

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

is an annihilating polynomial of $W^o_{0,0}M^o_{0,0}$. We use Padé-Hermite approximation to find a candidate for the minimal polynomial of $W^o_{0,0}M^o_{0,0}$, that will be called $\phi_0(x,y)$. To prove that $\phi_0(x,y)$ is indeed the minimal polynomial, it suffices to prove that it is an irreducible factor of $P(x,y)$ of multiplicity m and that $Q(x,y) := P(x,y)/\phi_0(x,y)^m$ is not an annihilating polynomial of $W^o_{0,0}M^o_{0,0}$. We verify the first point directly. For the second point, we truncate $W^o_{0,0}M^o_{0,0}$ to order 450 and substitute it for y in $Q(x,y)$. We get a series of valuation less than 450, 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 550 and substitute it for y in $Q(x,y)$. We get a series of valuation less than 550, and therefore $Q(x,y)$ is not an annihilating polynomial of $W^o_{0,0}M^o_{0,0} + W^o_{0,1}M^o_{1,0}$.

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

Define

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

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

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

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

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

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 $u = 2^{2k}$,

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

The proof of the other 15 cases are similar. We break down the above identity into 5 parts:

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

which can be rewritten as

$$0 = T[[w]_2] + T[[11w]_2] + T[[101w]_2], \tag{2.7}$$
$$0 = T[[1w]_2] + T[[100w]_2] + T[[110w]_2], \tag{2.8}$$
$$0 = T[[10w]_2] + T[[11w]_2] + T[[111w]_2], \tag{2.9}$$
$$0 = T[[11w]_2] + T[[100w]_2] + T[[1000w]_2], \tag{2.10}$$
$$0 = T[[11w]_2] + T[[100w]_2] + T[[1001w]_2], \tag{2.11}$$

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

$$1 = T[[w]_2] + T[[11w]_2] + T[[101w]_2], \tag{2.12}$$
$$0 = T[[1w]_2] + T[[100w]_2] + T[[110w]_2], \tag{2.13}$$
$$1 = T[[10w]_2] + T[[11w]_2] + T[[111w]_2], \tag{2.14}$$
$$0 = T[[11w]_2] + T[[100w]_2] + T[[1000w]_2], \tag{2.15}$$
$$1 = T[[11w]_2] + T[[100w]_2] + T[[1001w]_2], \tag{2.16}$$

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

First we calculate an 2-automaton that generates T from its minimal polynomial and its first terms. This automaton has 2045 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 (2.16) can be written as

$$0 = \tau(A(s,\epsilon)) + \tau(A(s,11)) + \tau(A(s,101)), \tag{2.17}$$

$$0 = \tau(A(s,1)) + \tau(A(s,100)) + \tau(A(s,110)), \tag{2.18}$$

$$0 = \tau(A(s,10)) + \tau(A(s,11)) + \tau(A(s,111)), \tag{2.19}$$

$$0 = \tau(A(s,11)) + \tau(A(s,100)) + \tau(A(s,1000)), \tag{2.20}$$

$$0 = \tau(A(s,11)) + \tau(A(s,100)) + \tau(A(s,1001)), \tag{2.21}$$

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

$$1 = \tau(A(s,\epsilon)) + \tau(A(s,11)) + \tau(A(s,101)), \tag{2.22}$$

$$0 = \tau(A(s,1)) + \tau(A(s,100)) + \tau(A(s,110)), \tag{2.23}$$

$$1 = \tau(A(s,10)) + \tau(A(s,11)) + \tau(A(s,111)), \tag{2.24}$$

$$0 = \tau(A(s,11)) + \tau(A(s,100)) + \tau(A(s,1000)), \tag{2.25}$$

$$1 = \tau(A(s,11)) + \tau(A(s,100)) + \tau(A(s,1001)), \tag{2.26}$$

for $s = A(i, 0^{2k})$. We find that $(A(i, 0^{74}), E_{74}) = (A(i, 0^{14}), E_{14})$, so that we only have to verify that identities (2.17) through (2.26) hold for $2 \le k \le 37$, 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 $k \ge 2$, and $u = 2^{2k-1}$,*

$$M_{2k} = M^e[:5u] + x^{2u} M^e[:3u] + x^{5u} R^e,$$
$$W_{2k} = W^e[:5u] + x^{2u} W^e[:3u] + x^{5u} R^e.$$

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

$$M_{2k+1} = M^o[:5u] + x^{2u} M^o[:3u] + x^{5u} R^o,$$
$$W_{2k+1} = W^o[:5u] + x^{2u} W^o[:3u] + x^{5u} R^o.$$

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

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

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

$$\begin{aligned} W_{2k}M_{2k} = \big(W^e[:5v] + x^{2v}W^e[:3v] + x^{5u}R^e\big) \times \big(M^e[:5v] + x^{2v}M^e[:3v] \\ + x^{5u}R^e\big); \end{aligned} \tag{2.27}$$

Call this expression lhs. Note that both sides of identity M_{2k+1} have the same term of highest degree $x^{10v}R^o$. Therefore we only need to prove that their difference is

$O(x^{10v})$. Using Lemma 2.1 it can be seen that the right side of identity M_{2k+1} is congruent, modulo x^{10v}, to

$$W^e[:10v]M^e[:10v] + x^{4v}W^e[:6v]M^e[:6v].$$

For all $n \leq 10$, 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 (2.27) and rhs as polynomials in $\mathbb{F}_2[a_1, ..., a_{10}, b_1, ..., b_{10}, c][X]$. 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 $O(X^{10})$, 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 $0 \leq j, k \leq 1$,

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

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

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

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

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

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

Define

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

where

$$\begin{aligned}
q_0(x) &= x^{20} + x^{15} + x^{14} + x^{11} + x^9 + x^8 + x^7 + x^5 + x^4,\\
q_1(x) &= x^{18} + x^{17} + x^{16} + x^{14} + x^{12} + x^8 + x^7 + x^4 + x^2 + x,\\
q_2(x) &= x^{20} + x^{16} + x^{14} + x^{12} + x^6 + x^4 + x^2 + 1,\\
q_3(x) &= x^{18} + x^{17} + x^{16} + x^{14} + x^{12} + x^8 + x^7 + x^4 + x^2 + x,\\
q_4(x) &= x^{20} + x^{16} + x^{15} + x^{11} + x^9 + x^7 + x^6 + x^5 + x^4 + x^2.
\end{aligned}$$

The polynomial $Q(x,y)$ is the candidate for the minimal polynomial of $f(x)$ found by Padé-Hermite approximation. To prove that it is indeed the minimal polynomial of $f(x)$, we only need to prove that it is an irreducible factor of $P(x,y)$ of multiplicity m and $R(x,y) := P(x,y)/Q(x,y)^m$ is not an annihilating polynomial of $f(x)$. We verify the first point directly. For the second point, we find that when we truncate $f(x)$ to order 156, and substitute it for y in $R(z,y)$, we get a series with valuation smaller than 156, 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 $\mathrm{CF}(a,b) = f(1/z)$. □

3. Annexe

All 16 polynomials are of the form

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

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

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

$$\begin{aligned}
p_0(x) &= x^{114} + x^{112} + x^{104} + x^{102} + x^{98} + x^{96} + x^{94} + x^{90} + x^{86} + x^{70} + x^{66} \\
&\quad + x^{64} + x^{58} + x^{54} + x^{52} + x^{50} + x^{38} + x^{28} + x^{16} + x^{14} + x^{12}, \\
p_3(x) &= x^{110} + x^{104} + x^{102} + x^{94} + x^{90} + x^{88} + x^{86} + x^{82} + x^{80} + x^{78} + x^{76} \\
&\quad + x^{74} + x^{68} + x^{66} + x^{62} + x^{60} + x^{58} + x^{54} + x^{52} + x^{48} + x^{46} + x^{42} \\
&\quad + x^{40} + x^{36} + x^{34} + x^{30} + x^{26} + x^{24} + x^{20} + x^{12} + x^{10} + x^{8}, \\
p_6(x) &= x^{106} + x^{102} + x^{100} + x^{98} + x^{90} + x^{88} + x^{80} + x^{78} + x^{74} + x^{70} + x^{68} \\
&\quad + x^{66} + x^{62} + x^{58} + x^{54} + x^{50} + x^{48} + x^{44} + x^{42} + x^{38} + x^{26} + x^{22} \\
&\quad + x^{20} + x^{10} + x^{8} + x^{6} + x^{4} + 1, \\
p_9(x) &= x^{110} + x^{106} + x^{102} + x^{96} + x^{90} + x^{86} + x^{84} + x^{74} + x^{68} + x^{66} + x^{64} \\
&\quad + x^{60} + x^{58} + x^{56} + x^{54} + x^{52} + x^{42} + x^{40} + x^{38} + x^{34} + x^{32} + x^{28} \\
&\quad + x^{20} + x^{18} + x^{16} + x^{12} + x^{10} + x^{8} + x^{4} + x^{2}, \\
p_{12}(x) &= x^{114} + x^{112} + x^{106} + x^{104} + x^{98} + x^{96} + x^{90} + x^{88} + x^{74} + x^{72} + x^{50} \\
&\quad + x^{48} + x^{34} + x^{32} + x^{10} + x^{8} + x^{2} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{105} + x^{101} + x^{100} + x^{99} + x^{97} + x^{93} + x^{91} + x^{89} + x^{88} + x^{87} + x^{83} \\
&\quad + x^{76} + x^{69} + x^{68} + x^{67} + x^{64} + x^{63} + x^{61} + x^{60} + x^{55} + x^{53} + x^{51} \\
&\quad + x^{49} + x^{46} + x^{44} + x^{43} + x^{42} + x^{41} + x^{39} + x^{36} + x^{33} + x^{32} + x^{31} \\
&\quad + x^{30} + x^{29} + x^{25} + x^{24} + x^{23} + x^{22} + x^{19} + x^{18}, \\
p_3(x) &= x^{87} + x^{86} + x^{85} + x^{83} + x^{82} + x^{80} + x^{79} + x^{75} + x^{74} + x^{73} + x^{69} \\
&\quad + x^{68} + x^{66} + x^{64} + x^{62} + x^{60} + x^{58} + x^{57} + x^{55} + x^{54} + x^{53} + x^{51} \\
&\quad + x^{50} + x^{48} + x^{47} + x^{43} + x^{42} + x^{41} + x^{37} + x^{36} + x^{34} + x^{32} + x^{31} \\
&\quad + x^{29} + x^{28} + x^{27} + x^{25} + x^{24} + x^{22} + x^{21} + x^{17} + x^{16} + x^{14} + x^{12}
\end{aligned}$$

$$
\begin{aligned}
&+ x^{10} + x^{9},\\
p_6(x) &= x^{93} + x^{91} + x^{88} + x^{87} + x^{86} + x^{85} + x^{83} + x^{82} + x^{81} + x^{80} + x^{78}\\
&+ x^{77} + x^{76} + x^{75} + x^{72} + x^{70} + x^{69} + x^{67} + x^{65} + x^{64} + x^{62} + x^{60}\\
&+ x^{59} + x^{57} + x^{55} + x^{54} + x^{52} + x^{50} + x^{49} + x^{47} + x^{44} + x^{43} + x^{42}\\
&+ x^{41} + x^{39} + x^{38} + x^{36} + x^{35} + x^{34} + x^{31} + x^{30} + x^{27} + x^{26} + x^{22}\\
&+ x^{21} + x^{16} + x^{15} + x^{13} + x^{11} + x^{10} + x^{8} + x^{6},\\
p_9(x) &= x^{99} + x^{98} + x^{96} + x^{95} + x^{87} + x^{86} + x^{85} + x^{83} + x^{82} + x^{80} + x^{78}\\
&+ x^{77} + x^{73} + x^{72} + x^{71} + x^{51} + x^{50} + x^{48} + x^{46} + x^{44} + x^{43} + x^{39}\\
&+ x^{38} + x^{37} + x^{35} + x^{34} + x^{33} + x^{29} + x^{28} + x^{27} + x^{23} + x^{22} + x^{20}\\
&+ x^{18} + x^{16} + x^{14} + x^{12} + x^{10} + x^{9} + x^{5} + x^{4} + x^{3},\\
p_{12}(x) &= x^{105} + x^{100} + x^{85} + x^{80} + x^{73} + x^{68} + x^{57} + x^{53} + x^{52} + x^{48} + x^{41}\\
&+ x^{37} + x^{36} + x^{32} + x^{25} + x^{21} + x^{20} + x^{16} + x^{5} + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{105} + x^{101} + x^{100} + x^{99} + x^{97} + x^{93} + x^{91} + x^{89} + x^{88} + x^{87} + x^{83}\\
&+ x^{76} + x^{69} + x^{68} + x^{67} + x^{64} + x^{63} + x^{61} + x^{60} + x^{55} + x^{53} + x^{51}\\
&+ x^{49} + x^{46} + x^{44} + x^{43} + x^{42} + x^{41} + x^{39} + x^{36} + x^{33} + x^{32} + x^{31}\\
&+ x^{30} + x^{29} + x^{25} + x^{24} + x^{23} + x^{22} + x^{19} + x^{18},\\
p_3(x) &= x^{87} + x^{86} + x^{85} + x^{83} + x^{82} + x^{80} + x^{79} + x^{75} + x^{74} + x^{73} + x^{69}\\
&+ x^{68} + x^{66} + x^{64} + x^{62} + x^{60} + x^{58} + x^{57} + x^{55} + x^{54} + x^{53} + x^{51}\\
&+ x^{50} + x^{48} + x^{47} + x^{43} + x^{42} + x^{41} + x^{37} + x^{36} + x^{34} + x^{32} + x^{31}\\
&+ x^{29} + x^{28} + x^{27} + x^{25} + x^{24} + x^{22} + x^{21} + x^{17} + x^{16} + x^{14} + x^{12}\\
&+ x^{10} + x^{9},\\
p_6(x) &= x^{93} + x^{91} + x^{88} + x^{87} + x^{86} + x^{85} + x^{83} + x^{82} + x^{81} + x^{80} + x^{78}\\
&+ x^{77} + x^{76} + x^{75} + x^{72} + x^{70} + x^{69} + x^{67} + x^{65} + x^{64} + x^{62} + x^{60}\\
&+ x^{59} + x^{57} + x^{55} + x^{54} + x^{52} + x^{50} + x^{49} + x^{47} + x^{44} + x^{43} + x^{42}\\
&+ x^{41} + x^{39} + x^{38} + x^{36} + x^{35} + x^{34} + x^{31} + x^{30} + x^{27} + x^{26} + x^{22}\\
&+ x^{21} + x^{16} + x^{15} + x^{13} + x^{11} + x^{10} + x^{8} + x^{6},\\
p_9(x) &= x^{99} + x^{98} + x^{96} + x^{95} + x^{87} + x^{86} + x^{85} + x^{83} + x^{82} + x^{80} + x^{78}\\
&+ x^{77} + x^{73} + x^{72} + x^{71} + x^{51} + x^{50} + x^{48} + x^{46} + x^{44} + x^{43} + x^{39}\\
&+ x^{38} + x^{37} + x^{35} + x^{34} + x^{33} + x^{29} + x^{28} + x^{27} + x^{23} + x^{22} + x^{20}\\
&+ x^{18} + x^{16} + x^{14} + x^{12} + x^{10} + x^{9} + x^{5} + x^{4} + x^{3},\\
p_{12}(x) &= x^{105} + x^{100} + x^{85} + x^{80} + x^{73} + x^{68} + x^{57} + x^{53} + x^{52} + x^{48} + x^{41}\\
&+ x^{37} + x^{36} + x^{32} + x^{25} + x^{21} + x^{20} + x^{16} + x^{5} + 1,
\end{aligned}
$$

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

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

$$\begin{aligned}
p_0(x) &= x^{96} + x^{94} + x^{92} + x^{90} + x^{84} + x^{82} + x^{80} + x^{76} + x^{74} + x^{72} + x^{70} \\
&\quad + x^{66} + x^{54} + x^{52} + x^{50} + x^{40} + x^{38} + x^{36} + x^{34} + x^{32} + x^{30} + x^{28} \\
&\quad + x^{24}, \\
p_3(x) &= x^{92} + x^{88} + x^{86} + x^{84} + x^{78} + x^{74} + x^{66} + x^{64} + x^{62} + x^{54} + x^{48} \\
&\quad + x^{46} + x^{44} + x^{42} + x^{40} + x^{38} + x^{36} + x^{34} + x^{30} + x^{24} + x^{18} + x^{16} \\
&\quad + x^{14} + x^{12} + x^{8} + x^{6}, \\
p_6(x) &= x^{86} + x^{84} + x^{82} + x^{78} + x^{76} + x^{74} + x^{70} + x^{64} + x^{58} + x^{46} + x^{38} \\
&\quad + x^{36} + x^{30} + x^{28} + x^{26} + x^{24} + x^{22} + x^{14} + x^{10} + x^{6} + x^{4} + 1, \\
p_9(x) &= x^{92} + x^{84} + x^{82} + x^{80} + x^{78} + x^{68} + x^{64} + x^{62} + x^{60} + x^{58} + x^{54} \\
&\quad + x^{52} + x^{50} + x^{48} + x^{42} + x^{38} + x^{36} + x^{32} + x^{30} + x^{28} + x^{26} + x^{24} \\
&\quad + x^{22} + x^{16} + x^{14} + x^{6} + x^{4} + x^{2}, \\
p_{12}(x) &= x^{96} + x^{94} + x^{92} + x^{90} + x^{86} + x^{84} + x^{82} + x^{80} + x^{64} + x^{62} + x^{60} \\
&\quad + x^{58} + x^{54} + x^{52} + x^{50} + x^{46} + x^{44} + x^{42} + x^{38} + x^{36} + x^{34} + x^{30} \\
&\quad + x^{28} + x^{26} + x^{22} + x^{20} + x^{18} + x^{14} + x^{12} + x^{10} + x^{6} + x^{4} + x^{2} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{96} + x^{94} + x^{92} + x^{90} + x^{88} + x^{86} + x^{84} + x^{82} + x^{74} + x^{72} + x^{70} \\
&\quad + x^{64} + x^{58} + x^{56} + x^{54} + x^{52} + x^{50} + x^{46} + x^{44} + x^{40} + x^{38} + x^{36} \\
&\quad + x^{34} + x^{28} + x^{16} + x^{14} + x^{12}, \\
p_3(x) &= x^{92} + x^{88} + x^{86} + x^{74} + x^{72} + x^{68} + x^{60} + x^{58} + x^{56} + x^{50} + x^{48} \\
&\quad + x^{46} + x^{42} + x^{40} + x^{34} + x^{28} + x^{22} + x^{20} + x^{16} + x^{8}, \\
p_6(x) &= x^{88} + x^{82} + x^{78} + x^{76} + x^{66} + x^{62} + x^{60} + x^{52} + x^{44} + x^{40} + x^{36} \\
&\quad + x^{32} + x^{24} + x^{10} + x^{6} + 1, \\
p_9(x) &= x^{92} + x^{84} + x^{82} + x^{80} + x^{78} + x^{68} + x^{64} + x^{62} + x^{60} + x^{58} + x^{54} \\
&\quad + x^{52} + x^{50} + x^{48} + x^{42} + x^{38} + x^{36} + x^{32} + x^{30} + x^{28} + x^{26} + x^{24} \\
&\quad + x^{22} + x^{16} + x^{14} + x^{6} + x^{4} + x^{2}, \\
p_{12}(x) &= x^{96} + x^{94} + x^{92} + x^{90} + x^{86} + x^{84} + x^{82} + x^{80} + x^{64} + x^{62} + x^{60} \\
&\quad + x^{58} + x^{54} + x^{52} + x^{50} + x^{46} + x^{44} + x^{42} + x^{38} + x^{36} + x^{34} + x^{30} \\
&\quad + x^{28} + x^{26} + x^{22} + x^{20} + x^{18} + x^{14} + x^{12} + x^{10} + x^{6} + x^{4} + x^{2} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{105} + x^{101} + x^{100} + x^{99} + x^{97} + x^{89} + x^{86} + x^{85} + x^{82} + x^{80} + x^{78} \\
&\quad + x^{77} + x^{76} + x^{75} + x^{68} + x^{67} + x^{66} + x^{65} + x^{63} + x^{60} + x^{58} + x^{56} \\
&\quad + x^{52} + x^{50} + x^{49} + x^{48} + x^{47} + x^{45} + x^{41} + x^{38} + x^{36} + x^{35} + x^{33}
\end{aligned}$$

$$
\begin{aligned}
&+ x^{32} + x^{30} + x^{27} + x^{26} + x^{25} + x^{24} + x^{23} + x^{21},\\
p_3(x) &= x^{87} + x^{86} + x^{85} + x^{83} + x^{82} + x^{80} + x^{79} + x^{75} + x^{74} + x^{73} + x^{69}\\
&+ x^{68} + x^{66} + x^{64} + x^{62} + x^{60} + x^{58} + x^{57} + x^{55} + x^{54} + x^{53} + x^{51}\\
&+ x^{50} + x^{48} + x^{47} + x^{43} + x^{42} + x^{41} + x^{37} + x^{36} + x^{34} + x^{32} + x^{31}\\
&+ x^{29} + x^{28} + x^{27} + x^{25} + x^{24} + x^{22} + x^{21} + x^{17} + x^{16} + x^{14} + x^{12}\\
&+ x^{10} + x^{9},\\
p_6(x) &= x^{93} + x^{91} + x^{88} + x^{87} + x^{86} + x^{85} + x^{83} + x^{82} + x^{81} + x^{80} + x^{78}\\
&+ x^{77} + x^{76} + x^{75} + x^{72} + x^{70} + x^{69} + x^{67} + x^{65} + x^{64} + x^{62} + x^{60}\\
&+ x^{59} + x^{57} + x^{55} + x^{54} + x^{52} + x^{50} + x^{49} + x^{47} + x^{44} + x^{43} + x^{42}\\
&+ x^{41} + x^{39} + x^{38} + x^{36} + x^{35} + x^{34} + x^{31} + x^{30} + x^{27} + x^{26} + x^{22}\\
&+ x^{21} + x^{16} + x^{15} + x^{13} + x^{11} + x^{10} + x^{8} + x^{6},\\
p_9(x) &= x^{99} + x^{98} + x^{96} + x^{95} + x^{87} + x^{86} + x^{85} + x^{83} + x^{82} + x^{80} + x^{78}\\
&+ x^{77} + x^{73} + x^{72} + x^{71} + x^{51} + x^{50} + x^{48} + x^{46} + x^{44} + x^{43} + x^{39}\\
&+ x^{38} + x^{37} + x^{35} + x^{34} + x^{33} + x^{29} + x^{28} + x^{27} + x^{23} + x^{22} + x^{20}\\
&+ x^{18} + x^{16} + x^{14} + x^{12} + x^{10} + x^{9} + x^{5} + x^{4} + x^{3},\\
p_{12}(x) &= x^{105} + x^{100} + x^{85} + x^{80} + x^{73} + x^{68} + x^{57} + x^{53} + x^{52} + x^{48} + x^{41}\\
&+ x^{37} + x^{36} + x^{32} + x^{25} + x^{21} + x^{20} + x^{16} + x^{5} + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{105} + x^{101} + x^{100} + x^{99} + x^{97} + x^{89} + x^{86} + x^{85} + x^{82} + x^{80} + x^{78}\\
&+ x^{77} + x^{76} + x^{75} + x^{68} + x^{67} + x^{66} + x^{65} + x^{63} + x^{60} + x^{58} + x^{56}\\
&+ x^{52} + x^{50} + x^{49} + x^{48} + x^{47} + x^{45} + x^{41} + x^{38} + x^{36} + x^{35} + x^{33}\\
&+ x^{32} + x^{30} + x^{27} + x^{26} + x^{25} + x^{24} + x^{23} + x^{21},\\
p_3(x) &= x^{87} + x^{86} + x^{85} + x^{83} + x^{82} + x^{80} + x^{79} + x^{75} + x^{74} + x^{73} + x^{69}\\
&+ x^{68} + x^{66} + x^{64} + x^{62} + x^{60} + x^{58} + x^{57} + x^{55} + x^{54} + x^{53} + x^{51}\\
&+ x^{50} + x^{48} + x^{47} + x^{43} + x^{42} + x^{41} + x^{37} + x^{36} + x^{34} + x^{32} + x^{31}\\
&+ x^{29} + x^{28} + x^{27} + x^{25} + x^{24} + x^{22} + x^{21} + x^{17} + x^{16} + x^{14} + x^{12}\\
&+ x^{10} + x^{9},\\
p_6(x) &= x^{93} + x^{91} + x^{88} + x^{87} + x^{86} + x^{85} + x^{83} + x^{82} + x^{81} + x^{80} + x^{78}\\
&+ x^{77} + x^{76} + x^{75} + x^{72} + x^{70} + x^{69} + x^{67} + x^{65} + x^{64} + x^{62} + x^{60}\\
&+ x^{59} + x^{57} + x^{55} + x^{54} + x^{52} + x^{50} + x^{49} + x^{47} + x^{44} + x^{43} + x^{42}\\
&+ x^{41} + x^{39} + x^{38} + x^{36} + x^{35} + x^{34} + x^{31} + x^{30} + x^{27} + x^{26} + x^{22}\\
&+ x^{21} + x^{16} + x^{15} + x^{13} + x^{11} + x^{10} + x^{8} + x^{6},\\
p_9(x) &= x^{99} + x^{98} + x^{96} + x^{95} + x^{87} + x^{86} + x^{85} + x^{83} + x^{82} + x^{80} + x^{78}\\
&+ x^{77} + x^{73} + x^{72} + x^{71} + x^{51} + x^{50} + x^{48} + x^{46} + x^{44} + x^{43} + x^{39}
\end{aligned}
$$

$$
\begin{aligned}
&+x^{38}+x^{37}+x^{35}+x^{34}+x^{33}+x^{29}+x^{28}+x^{27}+x^{23}+x^{22}+x^{20}\\
&+x^{18}+x^{16}+x^{14}+x^{12}+x^{10}+x^{9}+x^{5}+x^{4}+x^{3},\\
p_{12}(x) &= x^{105}+x^{100}+x^{85}+x^{80}+x^{73}+x^{68}+x^{57}+x^{53}+x^{52}+x^{48}+x^{41}\\
&+x^{37}+x^{36}+x^{32}+x^{25}+x^{21}+x^{20}+x^{16}+x^{5}+1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{114}+x^{112}+x^{106}+x^{100}+x^{92}+x^{86}+x^{84}+x^{80}+x^{78}+x^{76}+x^{72}\\
&+x^{66}+x^{62}+x^{56}+x^{54}+x^{50}+x^{42}+x^{40}+x^{38}+x^{36}+x^{34}+x^{32}\\
&+x^{30},\\
p_3(x) &= x^{110}+x^{104}+x^{98}+x^{96}+x^{94}+x^{86}+x^{84}+x^{80}+x^{74}+x^{72}+x^{68}\\
&+x^{66}+x^{52}+x^{48}+x^{38}+x^{36}+x^{34}+x^{30}+x^{28}+x^{26}+x^{20}+x^{14}\\
&+x^{8}+x^{6},\\
p_6(x) &= x^{104}+x^{102}+x^{96}+x^{94}+x^{92}+x^{90}+x^{88}+x^{86}+x^{82}+x^{80}+x^{78}\\
&+x^{74}+x^{72}+x^{66}+x^{62}+x^{58}+x^{56}+x^{54}+x^{52}+x^{42}+x^{34}+x^{32}\\
&+x^{28}+x^{26}+x^{24}+x^{10}+x^{6}+1,\\
p_9(x) &= x^{110}+x^{106}+x^{102}+x^{96}+x^{90}+x^{86}+x^{84}+x^{74}+x^{68}+x^{66}+x^{64}\\
&+x^{60}+x^{58}+x^{56}+x^{54}+x^{52}+x^{42}+x^{40}+x^{38}+x^{34}+x^{32}+x^{28}\\
&+x^{20}+x^{18}+x^{16}+x^{12}+x^{10}+x^{8}+x^{4}+x^{2},\\
p_{12}(x) &= x^{114}+x^{112}+x^{106}+x^{104}+x^{98}+x^{96}+x^{90}+x^{88}+x^{74}+x^{72}+x^{50}\\
&+x^{48}+x^{34}+x^{32}+x^{10}+x^{8}+x^{2}+1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{105}+x^{100}+x^{95}+x^{92}+x^{90}+x^{86}+x^{85}+x^{84}+x^{82}+x^{80}+x^{79}\\
&+x^{75}+x^{74}+x^{70}+x^{67}+x^{65}+x^{64}+x^{63}+x^{62}+x^{59}+x^{55}+x^{52}\\
&+x^{50}+x^{45}+x^{40}+x^{38}+x^{36}+x^{35}+x^{32}+x^{28}+x^{27}+x^{23}+x^{16}\\
&+x^{14}+x^{12},\\
p_3(x) &= x^{97}+x^{93}+x^{92}+x^{89}+x^{88}+x^{87}+x^{83}+x^{82}+x^{80}+x^{79}+x^{77}\\
&+x^{74}+x^{73}+x^{71}+x^{69}+x^{68}+x^{65}+x^{63}+x^{62}+x^{57}+x^{56}+x^{53}\\
&+x^{49}+x^{47}+x^{46}+x^{45}+x^{44}+x^{43}+x^{42}+x^{41}+x^{38}+x^{37}+x^{36}\\
&+x^{34}+x^{31}+x^{30}+x^{29}+x^{25}+x^{24}+x^{23}+x^{22}+x^{21}+x^{19}+x^{18}\\
&+x^{17}+x^{16}+x^{10}+x^{8},\\
p_6(x) &= x^{97}+x^{95}+x^{93}+x^{90}+x^{89}+x^{88}+x^{87}+x^{86}+x^{85}+x^{84}+x^{83}\\
&+x^{77}+x^{76}+x^{73}+x^{72}+x^{70}+x^{68}+x^{65}+x^{64}+x^{62}+x^{61}+x^{57}\\
&+x^{56}+x^{54}+x^{50}+x^{49}+x^{47}+x^{45}+x^{44}+x^{43}+x^{41}+x^{40}+x^{39}\\
&+x^{37}+x^{36}+x^{32}+x^{30}+x^{28}+x^{26}+x^{25}+x^{22}+x^{20}+x^{19}+x^{17}
\end{aligned}
$$

$$
\begin{aligned}
&+x^{15}+x^{14}+x^{13}+x^{12}+x^{6}+x^{5}+x^{4}+1,\\
p_9(x)&=x^{97}+x^{93}+x^{92}+x^{89}+x^{88}+x^{84}+x^{65}+x^{61}+x^{60}+x^{57}+x^{56}\\
&\quad+x^{52}+x^{49}+x^{45}+x^{44}+x^{41}+x^{40}+x^{36}+x^{33}+x^{29}+x^{28}+x^{25}\\
&\quad+x^{24}+x^{20}+x^{17}+x^{13}+x^{12}+x^{9}+x^{8}+x^{4},\\
p_{12}(x)&=x^{105}+x^{100}+x^{97}+x^{93}+x^{92}+x^{89}+x^{88}+x^{85}+x^{84}+x^{80}+x^{73}\\
&\quad+x^{68}+x^{65}+x^{61}+x^{60}+x^{56}+x^{53}+x^{49}+x^{48}+x^{45}+x^{44}+x^{40}\\
&\quad+x^{37}+x^{33}+x^{32}+x^{29}+x^{28}+x^{24}+x^{21}+x^{17}+x^{16}+x^{13}+x^{12}\\
&\quad+x^{9}+x^{8}+x^{5}+x^{4}+1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x)&=x^{104}+x^{98}+x^{96}+x^{95}+x^{94}+x^{93}+x^{91}+x^{90}+x^{89}+x^{88}+x^{85}\\
&\quad+x^{84}+x^{82}+x^{81}+x^{77}+x^{76}+x^{75}+x^{72}+x^{71}+x^{70}+x^{64}+x^{63}\\
&\quad+x^{59}+x^{56}+x^{53}+x^{51}+x^{50}+x^{49}+x^{48}+x^{45}+x^{43}+x^{41}+x^{40}\\
&\quad+x^{38}+x^{36}+x^{35}+x^{32}+x^{27}+x^{26}+x^{25}+x^{24}+x^{21}+x^{20}+x^{19}\\
&\quad+x^{18},\\
p_3(x)&=x^{86}+x^{85}+x^{84}+x^{82}+x^{79}+x^{78}+x^{76}+x^{72}+x^{71}+x^{67}+x^{65}\\
&\quad+x^{64}+x^{61}+x^{59}+x^{58}+x^{57}+x^{54}+x^{53}+x^{52}+x^{50}+x^{47}+x^{46}\\
&\quad+x^{44}+x^{40}+x^{39}+x^{35}+x^{33}+x^{32}+x^{30}+x^{28}+x^{27}+x^{25}+x^{23}\\
&\quad+x^{21}+x^{18}+x^{16}+x^{13}+x^{11}+x^{10}+x^{9},\\
p_6(x)&=x^{92}+x^{90}+x^{88}+x^{84}+x^{78}+x^{74}+x^{72}+x^{70}+x^{68}+x^{66}+x^{62}\\
&\quad+x^{60}+x^{58}+x^{56}+x^{52}+x^{50}+x^{48}+x^{46}+x^{44}+x^{40}+x^{36}+x^{22}\\
&\quad+x^{20}+x^{16}+x^{14}+x^{12}+x^{8}+x^{6},\\
p_9(x)&=x^{98}+x^{97}+x^{95}+x^{94}+x^{93}+x^{91}+x^{90}+x^{88}+x^{87}+x^{86}+x^{84}\\
&\quad+x^{83}+x^{66}+x^{65}+x^{63}+x^{62}+x^{61}+x^{59}+x^{58}+x^{56}+x^{55}+x^{54}\\
&\quad+x^{52}+x^{51}+x^{50}+x^{49}+x^{47}+x^{46}+x^{45}+x^{43}+x^{42}+x^{40}+x^{39}\\
&\quad+x^{38}+x^{36}+x^{35}+x^{34}+x^{33}+x^{31}+x^{30}+x^{29}+x^{27}+x^{26}+x^{24}\\
&\quad+x^{23}+x^{22}+x^{20}+x^{19}+x^{18}+x^{17}+x^{15}+x^{14}+x^{13}+x^{11}+x^{10}\\
&\quad+x^{8}+x^{7}+x^{6}+x^{4}+x^{3},\\
p_{12}(x)&=x^{104}+x^{100}+x^{96}+x^{80}+x^{72}+x^{68}+x^{64}+x^{56}+x^{52}+x^{40}+x^{36}\\
&\quad+x^{24}+x^{20}+1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x)&=x^{116}+x^{110}+x^{107}+x^{106}+x^{105}+x^{104}+x^{103}+x^{102}+x^{101}+x^{100}\\
&\quad+x^{99}+x^{98}+x^{96}+x^{95}+x^{91}+x^{90}+x^{89}+x^{87}+x^{86}+x^{85}+x^{81}\\
&\quad+x^{80}+x^{79}+x^{78}+x^{76}+x^{72}+x^{71}+x^{70}+x^{65}+x^{64}+x^{62}+x^{61}
\end{aligned}
$$

$$
\begin{aligned}
&+x^{60}+x^{59}+x^{58}+x^{57}+x^{54}+x^{52}+x^{50}+x^{49}+x^{47}+x^{46}+x^{45}\\
&+x^{40}+x^{35}+x^{33}+x^{32}+x^{30}+x^{29}+x^{28}+x^{24}+x^{21},\\
p_3(x)=&\,x^{98}+x^{97}+x^{96}+x^{94}+x^{91}+x^{89}+x^{86}+x^{84}+x^{81}+x^{79}+x^{76}\\
&+x^{74}+x^{71}+x^{69}+x^{65}+x^{62}+x^{61}+x^{58}+x^{54}+x^{52}+x^{49}+x^{47}\\
&+x^{44}+x^{41}+x^{40}+x^{39}+x^{38}+x^{37}+x^{35}+x^{29}+x^{28}+x^{24}+x^{23}\\
&+x^{19}+x^{17}+x^{16}+x^{13}+x^{11}+x^{10}+x^{9},\\
p_6(x)=&\,x^{104}+x^{102}+x^{100}+x^{94}+x^{92}+x^{90}+x^{84}+x^{82}+x^{78}+x^{72}+x^{70}\\
&+x^{68}+x^{66}+x^{64}+x^{62}+x^{60}+x^{58}+x^{52}+x^{42}+x^{40}+x^{38}+x^{36}\\
&+x^{32}+x^{30}+x^{28}+x^{26}+x^{22}+x^{12}+x^{8}+x^{6},\\
p_9(x)=&\,x^{110}+x^{109}+x^{107}+x^{106}+x^{105}+x^{103}+x^{101}+x^{100}+x^{97}+x^{96}\\
&+x^{93}+x^{92}+x^{90}+x^{88}+x^{87}+x^{86}+x^{84}+x^{83}+x^{78}+x^{77}+x^{75}\\
&+x^{74}+x^{73}+x^{71}+x^{69}+x^{68}+x^{65}+x^{64}+x^{62}+x^{60}+x^{59}+x^{57}\\
&+x^{56}+x^{54}+x^{53}+x^{51}+x^{49}+x^{48}+x^{46}+x^{44}+x^{43}+x^{41}+x^{40}\\
&+x^{38}+x^{37}+x^{35}+x^{33}+x^{32}+x^{30}+x^{28}+x^{27}+x^{25}+x^{24}+x^{22}\\
&+x^{21}+x^{19}+x^{17}+x^{16}+x^{13}+x^{12}+x^{10}+x^{8}+x^{7}+x^{6}+x^{4}+x^{3},\\
p_{12}(x)=&\,x^{116}+x^{112}+x^{104}+x^{88}+x^{84}+x^{72}+x^{68}+x^{64}+x^{52}+x^{36}+x^{16}\\
&+x^{8}+1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x)=&\,x^{105}+x^{100}+x^{97}+x^{95}+x^{91}+x^{90}+x^{87}+x^{85}+x^{84}+x^{81}+x^{80}\\
&+x^{77}+x^{72}+x^{71}+x^{70}+x^{69}+x^{68}+x^{65}+x^{64}+x^{61}+x^{60}+x^{59}\\
&+x^{55}+x^{53}+x^{50}+x^{49}+x^{43}+x^{41}+x^{40}+x^{39}+x^{35}+x^{32}+x^{30}\\
&+x^{28}+x^{27},\\
p_3(x)=&\,x^{97}+x^{93}+x^{92}+x^{88}+x^{87}+x^{85}+x^{84}+x^{82}+x^{79}+x^{78}+x^{74}\\
&+x^{73}+x^{72}+x^{68}+x^{67}+x^{66}+x^{64}+x^{61}+x^{60}+x^{58}+x^{52}+x^{51}\\
&+x^{49}+x^{48}+x^{47}+x^{44}+x^{43}+x^{42}+x^{41}+x^{40}+x^{39}+x^{38}+x^{36}\\
&+x^{35}+x^{32}+x^{29}+x^{27}+x^{26}+x^{24}+x^{23}+x^{21}+x^{20}+x^{18}+x^{16}\\
&+x^{15}+x^{14}+x^{13}+x^{12},\\
p_6(x)=&\,x^{95}+x^{93}+x^{92}+x^{91}+x^{90}+x^{89}+x^{88}+x^{84}+x^{82}+x^{81}+x^{80}\\
&+x^{78}+x^{77}+x^{75}+x^{73}+x^{72}+x^{69}+x^{68}+x^{67}+x^{61}+x^{60}+x^{59}\\
&+x^{56}+x^{55}+x^{52}+x^{49}+x^{45}+x^{44}+x^{42}+x^{41}+x^{40}+x^{38}+x^{37}\\
&+x^{36}+x^{35}+x^{34}+x^{33}+x^{32}+x^{31}+x^{27}+x^{25}+x^{20}+x^{19}+x^{17}\\
&+x^{14}+x^{12}+x^{11}+x^{10}+x^{9}+x^{8}+x^{5}+1,\\
p_9(x)=&\,x^{97}+x^{93}+x^{92}+x^{89}+x^{88}+x^{84}+x^{65}+x^{61}+x^{60}+x^{57}+x^{56}\\
&+x^{52}+x^{49}+x^{45}+x^{44}+x^{41}+x^{40}+x^{36}+x^{33}+x^{29}+x^{28}+x^{25}
\end{aligned}
$$

$$\begin{aligned}
&+ x^{24} + x^{20} + x^{17} + x^{13} + x^{12} + x^{9} + x^{8} + x^{4},\\
p_{12}(x) &= x^{105} + x^{100} + x^{97} + x^{93} + x^{92} + x^{89} + x^{88} + x^{85} + x^{84} + x^{80} + x^{73}\\
&+ x^{68} + x^{65} + x^{61} + x^{60} + x^{56} + x^{53} + x^{49} + x^{48} + x^{45} + x^{44} + x^{40}\\
&+ x^{37} + x^{33} + x^{32} + x^{29} + x^{28} + x^{24} + x^{21} + x^{17} + x^{16} + x^{13} + x^{12}\\
&+ x^{9} + x^{8} + x^{5} + x^{4} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{105} + x^{100} + x^{95} + x^{92} + x^{90} + x^{86} + x^{85} + x^{84} + x^{82} + x^{80} + x^{79}\\
&+ x^{75} + x^{74} + x^{70} + x^{67} + x^{65} + x^{64} + x^{63} + x^{62} + x^{59} + x^{55} + x^{52}\\
&+ x^{50} + x^{45} + x^{40} + x^{38} + x^{36} + x^{35} + x^{32} + x^{28} + x^{27} + x^{23} + x^{16}\\
&+ x^{14} + x^{12},\\
p_3(x) &= x^{97} + x^{93} + x^{92} + x^{89} + x^{88} + x^{87} + x^{83} + x^{82} + x^{80} + x^{79} + x^{77}\\
&+ x^{74} + x^{73} + x^{71} + x^{69} + x^{68} + x^{65} + x^{63} + x^{62} + x^{57} + x^{56} + x^{53}\\
&+ x^{49} + x^{47} + x^{46} + x^{45} + x^{44} + x^{43} + x^{42} + x^{41} + x^{38} + x^{37} + x^{36}\\
&+ x^{34} + x^{31} + x^{30} + x^{29} + x^{25} + x^{24} + x^{23} + x^{22} + x^{21} + x^{19} + x^{18}\\
&+ x^{17} + x^{16} + x^{10} + x^{8},\\
p_6(x) &= x^{97} + x^{95} + x^{93} + x^{90} + x^{89} + x^{88} + x^{87} + x^{86} + x^{85} + x^{84} + x^{83}\\
&+ x^{77} + x^{76} + x^{73} + x^{72} + x^{70} + x^{68} + x^{65} + x^{64} + x^{62} + x^{61} + x^{57}\\
&+ x^{56} + x^{54} + x^{50} + x^{49} + x^{47} + x^{45} + x^{44} + x^{43} + x^{41} + x^{40} + x^{39}\\
&+ x^{37} + x^{36} + x^{32} + x^{30} + x^{28} + x^{26} + x^{25} + x^{22} + x^{20} + x^{19} + x^{17}\\
&+ x^{15} + x^{14} + x^{13} + x^{12} + x^{6} + x^{5} + x^{4} + 1,\\
p_9(x) &= x^{97} + x^{93} + x^{92} + x^{89} + x^{88} + x^{84} + x^{65} + x^{61} + x^{60} + x^{57} + x^{56}\\
&+ x^{52} + x^{49} + x^{45} + x^{44} + x^{41} + x^{40} + x^{36} + x^{33} + x^{29} + x^{28} + x^{25}\\
&+ x^{24} + x^{20} + x^{17} + x^{13} + x^{12} + x^{9} + x^{8} + x^{4},\\
p_{12}(x) &= x^{105} + x^{100} + x^{97} + x^{93} + x^{92} + x^{89} + x^{88} + x^{85} + x^{84} + x^{80} + x^{73}\\
&+ x^{68} + x^{65} + x^{61} + x^{60} + x^{56} + x^{53} + x^{49} + x^{48} + x^{45} + x^{44} + x^{40}\\
&+ x^{37} + x^{33} + x^{32} + x^{29} + x^{28} + x^{24} + x^{21} + x^{17} + x^{16} + x^{13} + x^{12}\\
&+ x^{9} + x^{8} + x^{5} + x^{4} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{116} + x^{110} + x^{107} + x^{106} + x^{105} + x^{104} + x^{103} + x^{102} + x^{101} + x^{100}\\
&+ x^{99} + x^{98} + x^{96} + x^{95} + x^{91} + x^{90} + x^{89} + x^{87} + x^{86} + x^{85} + x^{81}\\
&+ x^{80} + x^{79} + x^{78} + x^{76} + x^{72} + x^{71} + x^{70} + x^{65} + x^{64} + x^{62} + x^{61}\\
&+ x^{60} + x^{59} + x^{58} + x^{57} + x^{54} + x^{52} + x^{50} + x^{49} + x^{47} + x^{46} + x^{45}\\
&+ x^{40} + x^{35} + x^{33} + x^{32} + x^{30} + x^{29} + x^{28} + x^{24} + x^{21},
\end{aligned}$$

$$\begin{aligned}
p_3(x) &= x^{98}+x^{97}+x^{96}+x^{94}+x^{91}+x^{89}+x^{86}+x^{84}+x^{81}+x^{79}+x^{76}\\
&\quad +x^{74}+x^{71}+x^{69}+x^{65}+x^{62}+x^{61}+x^{58}+x^{54}+x^{52}+x^{49}+x^{47}\\
&\quad +x^{44}+x^{41}+x^{40}+x^{39}+x^{38}+x^{37}+x^{35}+x^{29}+x^{28}+x^{24}+x^{23}\\
&\quad +x^{19}+x^{17}+x^{16}+x^{13}+x^{11}+x^{10}+x^{9},\\
p_6(x) &= x^{104}+x^{102}+x^{100}+x^{94}+x^{92}+x^{90}+x^{84}+x^{82}+x^{78}+x^{72}+x^{70}\\
&\quad +x^{68}+x^{66}+x^{64}+x^{62}+x^{60}+x^{58}+x^{52}+x^{42}+x^{40}+x^{38}+x^{36}\\
&\quad +x^{32}+x^{30}+x^{28}+x^{26}+x^{22}+x^{12}+x^{8}+x^{6},\\
p_9(x) &= x^{110}+x^{109}+x^{107}+x^{106}+x^{105}+x^{103}+x^{101}+x^{100}+x^{97}+x^{96}\\
&\quad +x^{93}+x^{92}+x^{90}+x^{88}+x^{87}+x^{86}+x^{84}+x^{83}+x^{78}+x^{77}+x^{75}\\
&\quad +x^{74}+x^{73}+x^{71}+x^{69}+x^{68}+x^{65}+x^{64}+x^{62}+x^{60}+x^{59}+x^{57}\\
&\quad +x^{56}+x^{54}+x^{53}+x^{51}+x^{49}+x^{48}+x^{46}+x^{44}+x^{43}+x^{41}+x^{40}\\
&\quad +x^{38}+x^{37}+x^{35}+x^{33}+x^{32}+x^{30}+x^{28}+x^{27}+x^{25}+x^{24}+x^{22}\\
&\quad +x^{21}+x^{19}+x^{17}+x^{16}+x^{13}+x^{12}+x^{10}+x^{8}+x^{7}+x^{6}+x^{4}+x^{3},\\
p_{12}(x) &= x^{116}+x^{112}+x^{104}+x^{88}+x^{84}+x^{72}+x^{68}+x^{64}+x^{52}+x^{36}+x^{16}\\
&\quad +x^{8}+1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{104}+x^{98}+x^{96}+x^{95}+x^{94}+x^{93}+x^{91}+x^{90}+x^{89}+x^{88}+x^{85}\\
&\quad +x^{84}+x^{82}+x^{81}+x^{77}+x^{76}+x^{75}+x^{72}+x^{71}+x^{70}+x^{64}+x^{63}\\
&\quad +x^{59}+x^{56}+x^{53}+x^{51}+x^{50}+x^{49}+x^{48}+x^{45}+x^{43}+x^{41}+x^{40}\\
&\quad +x^{38}+x^{36}+x^{35}+x^{32}+x^{27}+x^{26}+x^{25}+x^{24}+x^{21}+x^{20}+x^{19}\\
&\quad +x^{18},\\
p_3(x) &= x^{86}+x^{85}+x^{84}+x^{82}+x^{79}+x^{78}+x^{76}+x^{72}+x^{71}+x^{67}+x^{65}\\
&\quad +x^{64}+x^{61}+x^{59}+x^{58}+x^{57}+x^{54}+x^{53}+x^{52}+x^{50}+x^{47}+x^{46}\\
&\quad +x^{44}+x^{40}+x^{39}+x^{35}+x^{33}+x^{32}+x^{30}+x^{28}+x^{27}+x^{25}+x^{23}\\
&\quad +x^{21}+x^{18}+x^{16}+x^{13}+x^{11}+x^{10}+x^{9},\\
p_6(x) &= x^{92}+x^{90}+x^{88}+x^{84}+x^{78}+x^{74}+x^{72}+x^{70}+x^{68}+x^{66}+x^{62}\\
&\quad +x^{60}+x^{58}+x^{56}+x^{52}+x^{50}+x^{48}+x^{46}+x^{44}+x^{40}+x^{36}+x^{22}\\
&\quad +x^{20}+x^{16}+x^{14}+x^{12}+x^{8}+x^{6},\\
p_9(x) &= x^{98}+x^{97}+x^{95}+x^{94}+x^{93}+x^{91}+x^{90}+x^{88}+x^{87}+x^{86}+x^{84}\\
&\quad +x^{83}+x^{66}+x^{65}+x^{63}+x^{62}+x^{61}+x^{59}+x^{58}+x^{56}+x^{55}+x^{54}\\
&\quad +x^{52}+x^{51}+x^{50}+x^{49}+x^{47}+x^{46}+x^{45}+x^{43}+x^{42}+x^{40}+x^{39}\\
&\quad +x^{38}+x^{36}+x^{35}+x^{34}+x^{33}+x^{31}+x^{30}+x^{29}+x^{27}+x^{26}+x^{24}\\
&\quad +x^{23}+x^{22}+x^{20}+x^{19}+x^{18}+x^{17}+x^{15}+x^{14}+x^{13}+x^{11}+x^{10}\\
&\quad +x^{8}+x^{7}+x^{6}+x^{4}+x^{3},
\end{aligned}$$

$$\begin{aligned}p_{12}(x) &= x^{104}+x^{100}+x^{96}+x^{80}+x^{72}+x^{68}+x^{64}+x^{56}+x^{52}+x^{40}+x^{36}\\ &\quad +x^{24}+x^{20}+1,\end{aligned}$$

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

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

$$\begin{aligned}p_{0}(x) &= x^{105}+x^{100}+x^{97}+x^{95}+x^{91}+x^{90}+x^{87}+x^{85}+x^{84}+x^{81}+x^{80}\\ &\quad +x^{77}+x^{72}+x^{71}+x^{70}+x^{69}+x^{68}+x^{65}+x^{64}+x^{61}+x^{60}+x^{59}\\ &\quad +x^{55}+x^{53}+x^{50}+x^{49}+x^{43}+x^{41}+x^{40}+x^{39}+x^{35}+x^{32}+x^{30}\\ &\quad +x^{28}+x^{27},\\ p_{3}(x) &= x^{97}+x^{93}+x^{92}+x^{88}+x^{87}+x^{85}+x^{84}+x^{82}+x^{79}+x^{78}+x^{74}\\ &\quad +x^{73}+x^{72}+x^{68}+x^{67}+x^{66}+x^{64}+x^{61}+x^{60}+x^{58}+x^{52}+x^{51}\\ &\quad +x^{49}+x^{48}+x^{47}+x^{44}+x^{43}+x^{42}+x^{41}+x^{40}+x^{39}+x^{38}+x^{36}\\ &\quad +x^{35}+x^{32}+x^{29}+x^{27}+x^{26}+x^{24}+x^{23}+x^{21}+x^{20}+x^{18}+x^{16}\\ &\quad +x^{15}+x^{14}+x^{13}+x^{12},\\ p_{6}(x) &= x^{95}+x^{93}+x^{92}+x^{91}+x^{90}+x^{89}+x^{88}+x^{84}+x^{82}+x^{81}+x^{80}\\ &\quad +x^{78}+x^{77}+x^{75}+x^{73}+x^{72}+x^{69}+x^{68}+x^{67}+x^{61}+x^{60}+x^{59}\\ &\quad +x^{56}+x^{55}+x^{52}+x^{49}+x^{45}+x^{44}+x^{42}+x^{41}+x^{40}+x^{38}+x^{37}\\ &\quad +x^{36}+x^{35}+x^{34}+x^{33}+x^{32}+x^{31}+x^{27}+x^{25}+x^{20}+x^{19}+x^{17}\\ &\quad +x^{14}+x^{12}+x^{11}+x^{10}+x^{9}+x^{8}+x^{5}+1,\\ p_{9}(x) &= x^{97}+x^{93}+x^{92}+x^{89}+x^{88}+x^{84}+x^{65}+x^{61}+x^{60}+x^{57}+x^{56}\\ &\quad +x^{52}+x^{49}+x^{45}+x^{44}+x^{41}+x^{40}+x^{36}+x^{33}+x^{29}+x^{28}+x^{25}\\ &\quad +x^{24}+x^{20}+x^{17}+x^{13}+x^{12}+x^{9}+x^{8}+x^{4},\\ p_{12}(x) &= x^{105}+x^{100}+x^{97}+x^{93}+x^{92}+x^{89}+x^{88}+x^{85}+x^{84}+x^{80}+x^{73}\\ &\quad +x^{68}+x^{65}+x^{61}+x^{60}+x^{56}+x^{53}+x^{49}+x^{48}+x^{45}+x^{44}+x^{40}\\ &\quad +x^{37}+x^{33}+x^{32}+x^{29}+x^{28}+x^{24}+x^{21}+x^{17}+x^{16}+x^{13}+x^{12}\\ &\quad +x^{9}+x^{8}+x^{5}+x^{4}+1,\end{aligned}$$

and the initial terms are [0, 0, 0, 0, 0, 1, 0, 1, 0, 1, 0, 1, 1, 1, 1, 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]	512	[880, 87]	1024	[1513, 1514]	1536	[1786, 1163]
1	[3, 4]	513	[881, 882]	1025	[757, 1515]	1537	[1887, 1787]
2	[5, 6]	514	[883, 390]	1026	[1516, 1517]	1538	[1781, 1207]
3	[7, 8]	515	[884, 885]	1027	[1518, 197]	1539	[993, 828]
4	[9, 10]	516	[886, 887]	1028	[136, 569]	1540	[1248, 1888]
5	[11, 12]	517	[888, 889]	1029	[1519, 1520]	1541	[378, 1889]
6	[13, 14]	518	[325, 890]	1030	[1521, 1325]	1542	[1101, 1058]

7	[15, 16]	519	[374, 891]	1031	[664, 1522]	1543	[1890, 1891]
8	[17, 18]	520	[892, 95]	1032	[795, 1523]	1544	[1783, 1879]
9	[19, 20]	521	[893, 894]	1033	[1524, 1525]	1545	[917, 893]
10	[21, 22]	522	[895, 896]	1034	[1354, 775]	1546	[1774, 336]
11	[23, 24]	523	[430, 897]	1035	[1526, 738]	1547	[1892, 1892]
12	[25, 26]	524	[867, 898]	1036	[708, 1527]	1548	[1893, 1894]
13	[27, 28]	525	[80, 276]	1037	[1528, 1504]	1549	[1739, 1803]
14	[29, 30]	526	[899, 900]	1038	[1529, 1530]	1550	[82, 1858]
15	[31, 32]	527	[901, 97]	1039	[1531, 1532]	1551	[1895, 946]
16	[33, 34]	528	[902, 903]	1040	[765, 635]	1552	[408, 1868]
17	[35, 36]	529	[904, 905]	1041	[1493, 244]	1553	[1194, 1824]
18	[37, 38]	530	[906, 907]	1042	[1359, 165]	1554	[939, 1218]
19	[39, 40]	531	[294, 873]	1043	[530, 1533]	1555	[1896, 851]
20	[41, 42]	532	[908, 256]	1044	[1479, 751]	1556	[1897, 1844]
21	[43, 44]	533	[865, 909]	1045	[1534, 1535]	1557	[72, 91]
22	[45, 46]	534	[910, 911]	1046	[1365, 1536]	1558	[360, 1812]
23	[47, 48]	535	[912, 913]	1047	[1537, 1375]	1559	[965, 1814]
24	[49, 50]	536	[323, 914]	1048	[736, 135]	1560	[1898, 1791]
25	[51, 52]	537	[915, 19]	1049	[1538, 1539]	1561	[1899, 1230]
26	[53, 54]	538	[916, 917]	1050	[1530, 1540]	1562	[417, 1730]
27	[55, 56]	539	[918, 859]	1051	[1541, 1542]	1563	[900, 999]
28	[57, 58]	540	[919, 920]	1052	[669, 1543]	1564	[1159, 1893]
29	[59, 60]	541	[816, 921]	1053	[790, 1513]	1565	[1900, 1235]
30	[61, 62]	542	[922, 4]	1054	[674, 1406]	1566	[1070, 1744]
31	[63, 64]	543	[923, 416]	1055	[1544, 1516]	1567	[1901, 1902]
32	[65, 66]	544	[924, 925]	1056	[1374, 1518]	1568	[116, 1008]
33	[67, 68]	545	[926, 927]	1057	[1458, 686]	1569	[1779, 1874]
34	[69, 70]	546	[94, 928]	1058	[14, 1485]	1570	[1903, 375]
35	[71, 72]	547	[929, 849]	1059	[1448, 1545]	1571	[1904, 1829]
36	[73, 74]	548	[114, 930]	1060	[755, 527]	1572	[112, 443]
37	[75, 76]	549	[931, 932]	1061	[753, 652]	1573	[1905, 1900]
38	[77, 78]	550	[933, 934]	1062	[1546, 33]	1574	[1156, 1906]
39	[79, 80]	551	[935, 448]	1063	[1301, 1547]	1575	[1794, 1743]
40	[81, 82]	552	[936, 937]	1064	[1548, 1549]	1576	[273, 1904]
41	[83, 84]	553	[938, 939]	1065	[1550, 1551]	1577	[1041, 1003]
42	[85, 86]	554	[940, 941]	1066	[475, 1552]	1578	[1201, 1750]
43	[87, 88]	555	[942, 943]	1067	[1486, 1288]	1579	[1907, 809]
44	[89, 90]	556	[944, 945]	1068	[1553, 797]	1580	[1769, 1908]
45	[91, 92]	557	[946, 947]	1069	[1554, 1555]	1581	[1213, 1905]
46	[93, 94]	558	[948, 949]	1070	[62, 1556]	1582	[890, 1223]
47	[95, 96]	559	[253, 950]	1071	[60, 700]	1583	[1706, 369]
48	[97, 98]	560	[951, 952]	1072	[205, 722]	1584	[1019, 113]
49	[99, 100]	561	[829, 953]	1073	[1357, 1557]	1585	[1862, 107]
50	[101, 102]	562	[954, 955]	1074	[1558, 1559]	1586	[1066, 1909]

51	[103, 104]	563	[909, 956]	1075	[595, 129]	1587	[1017, 1152]
52	[105, 106]	564	[957, 958]	1076	[1450, 1560]	1588	[1049, 67]
53	[107, 108]	565	[959, 960]	1077	[198, 1561]	1589	[1908, 1820]
54	[109, 110]	566	[302, 961]	1078	[1562, 1296]	1590	[1096, 1204]
55	[111, 112]	567	[962, 963]	1079	[1563, 1415]	1591	[370, 1910]
56	[113, 114]	568	[964, 965]	1080	[1467, 1344]	1592	[449, 866]
57	[115, 116]	569	[966, 967]	1081	[1564, 1565]	1593	[267, 1789]
58	[117, 118]	570	[968, 969]	1082	[1310, 1548]	1594	[1864, 1838]
59	[119, 120]	571	[970, 274]	1083	[1566, 1314]	1595	[846, 433]
60	[121, 122]	572	[971, 972]	1084	[1567, 1568]	1596	[307, 1809]
61	[123, 124]	573	[973, 338]	1085	[1569, 202]	1597	[870, 1221]
62	[125, 126]	574	[974, 975]	1086	[1570, 235]	1598	[1134, 1839]
63	[127, 128]	575	[976, 977]	1087	[1571, 1464]	1599	[1881, 1911]
64	[129, 130]	576	[978, 979]	1088	[1572, 1563]	1600	[1902, 912]
65	[131, 132]	577	[969, 435]	1089	[551, 157]	1601	[1729, 1847]
66	[133, 134]	578	[30, 980]	1090	[1573, 1564]	1602	[1093, 1083]
67	[135, 136]	579	[981, 982]	1091	[1543, 1574]	1603	[913, 1202]
68	[137, 138]	580	[983, 310]	1092	[1575, 1566]	1604	[1054, 1024]
69	[139, 140]	581	[329, 984]	1093	[1535, 1367]	1605	[1749, 908]
70	[141, 142]	582	[985, 986]	1094	[1540, 1481]	1606	[1912, 73]
71	[143, 144]	583	[987, 904]	1095	[201, 1358]	1607	[1876, 1768]
72	[145, 39]	584	[988, 989]	1096	[1576, 1553]	1608	[1913, 1034]
73	[146, 147]	585	[990, 456]	1097	[1577, 177]	1609	[1845, 957]
74	[148, 149]	586	[820, 991]	1098	[1578, 1579]	1610	[1891, 959]
75	[150, 151]	587	[992, 993]	1099	[1580, 1529]	1611	[1005, 1211]
76	[152, 153]	588	[994, 454]	1100	[518, 469]	1612	[1188, 1703]
77	[140, 154]	589	[995, 996]	1101	[1581, 732]	1613	[905, 1875]
78	[155, 156]	590	[997, 998]	1102	[1582, 764]	1614	[1914, 1887]
79	[157, 158]	591	[999, 1000]	1103	[1574, 186]	1615	[1257, 1817]
80	[159, 160]	592	[455, 1001]	1104	[1583, 1584]	1616	[1151, 272]
81	[161, 162]	593	[1002, 970]	1105	[1585, 1586]	1617	[1842, 918]
82	[163, 164]	594	[1003, 971]	1106	[774, 643]	1618	[1915, 1816]
83	[165, 166]	595	[406, 884]	1107	[605, 1587]	1619	[1183, 400]
84	[167, 168]	596	[1004, 1005]	1108	[734, 514]	1620	[1111, 1903]
85	[169, 170]	597	[1006, 1007]	1109	[1588, 1441]	1621	[1916, 1200]
86	[171, 172]	598	[1008, 1009]	1110	[1589, 519]	1622	[1910, 1708]
87	[173, 174]	599	[1010, 1011]	1111	[226, 526]	1623	[885, 1856]
88	[175, 176]	600	[1012, 425]	1112	[1590, 1306]	1624	[1889, 1866]
89	[177, 35]	601	[279, 69]	1113	[1340, 221]	1625	[1894, 1198]
90	[178, 179]	602	[20, 1013]	1114	[1591, 1592]	1626	[1917, 1138]
91	[180, 181]	603	[1014, 1015]	1115	[584, 506]	1627	[1164, 1917]
92	[182, 183]	604	[1016, 1017]	1116	[1442, 1593]	1628	[1128, 988]
93	[184, 185]	605	[1018, 1019]	1117	[208, 1446]	1629	[1918, 1898]
94	[186, 59]	606	[1020, 1021]	1118	[1482, 1594]	1630	[359, 1919]

95	[187, 188]	607	[1022, 1023]	1119	[1595, 131]	1631	[1920, 1112]
96	[189, 190]	608	[1024, 1025]	1120	[172, 1596]	1632	[1796, 821]
97	[191, 192]	609	[1026, 1027]	1121	[611, 1597]	1633	[285, 1177]
98	[193, 194]	610	[1028, 1029]	1122	[691, 1598]	1634	[1921, 1731]
99	[195, 196]	611	[1030, 855]	1123	[1599, 1600]	1635	[1023, 1918]
100	[197, 198]	612	[1031, 1032]	1124	[579, 1595]	1636	[1180, 1846]
101	[149, 199]	613	[1033, 387]	1125	[238, 489]	1637	[1922, 1722]
102	[200, 201]	614	[1034, 1035]	1126	[725, 1601]	1638	[395, 1805]
103	[202, 203]	615	[1036, 1037]	1127	[1602, 550]	1639	[1068, 1915]
104	[204, 205]	616	[1038, 808]	1128	[1460, 1475]	1640	[1775, 1886]
105	[8, 206]	617	[949, 85]	1129	[638, 517]	1641	[1923, 1209]
106	[207, 208]	618	[1039, 427]	1130	[538, 9]	1642	[845, 1738]
107	[209, 210]	619	[311, 117]	1131	[1603, 733]	1643	[1888, 1831]
108	[211, 212]	620	[1040, 1041]	1132	[1604, 1454]	1644	[1865, 1880]
109	[213, 214]	621	[1042, 1043]	1133	[1322, 1605]	1645	[852, 383]
110	[215, 216]	622	[1044, 1045]	1134	[1592, 1606]	1646	[1873, 872]
111	[217, 218]	623	[1046, 1047]	1135	[1341, 1272]	1647	[882, 922]
112	[219, 220]	624	[841, 836]	1136	[1607, 1608]	1648	[1145, 391]
113	[221, 222]	625	[1048, 1049]	1137	[1609, 1610]	1649	[1906, 1916]
114	[223, 224]	626	[1050, 330]	1138	[1611, 1612]	1650	[850, 1899]
115	[225, 226]	627	[1051, 1052]	1139	[1523, 1613]	1651	[1009, 1921]
116	[227, 228]	628	[1053, 1054]	1140	[1614, 1615]	1652	[1911, 1799]
117	[229, 230]	629	[1055, 1056]	1141	[1616, 1351]	1653	[1813, 1920]
118	[231, 232]	630	[889, 1057]	1142	[236, 1456]	1654	[839, 1907]
119	[233, 234]	631	[1058, 1059]	1143	[1617, 719]	1655	[1924, 1883]
120	[235, 236]	632	[1021, 1060]	1144	[1469, 1377]	1656	[1189, 1827]
121	[237, 238]	633	[1061, 1062]	1145	[470, 1618]	1657	[1242, 1069]
122	[239, 240]	634	[1063, 1064]	1146	[634, 1492]	1658	[921, 249]
123	[241, 242]	635	[960, 410]	1147	[1552, 1496]	1659	[1227, 278]
124	[243, 133]	636	[380, 1065]	1148	[504, 524]	1660	[920, 5]
125	[244, 245]	637	[950, 1066]	1149	[540, 587]	1661	[998, 1118]
126	[246, 247]	638	[1067, 1016]	1150	[718, 1585]	1662	[1047, 1859]
127	[248, 249]	639	[259, 1068]	1151	[1436, 1572]	1663	[1804, 301]
128	[250, 251]	640	[1069, 1070]	1152	[1503, 1619]	1664	[368, 109]
129	[252, 253]	641	[1071, 1072]	1153	[1505, 155]	1665	[1186, 1751]
130	[254, 255]	642	[1073, 1074]	1154	[1620, 1621]	1666	[1099, 1821]
131	[256, 257]	643	[1075, 1076]	1155	[1510, 1407]	1667	[1168, 1925]
132	[258, 259]	644	[1077, 1078]	1156	[1622, 1623]	1668	[1025, 1926]
133	[260, 261]	645	[1079, 1080]	1157	[1624, 1500]	1669	[392, 1832]
134	[262, 263]	646	[1081, 1082]	1158	[747, 1501]	1670	[453, 1927]
135	[264, 265]	647	[1083, 929]	1159	[128, 1264]	1671	[1928, 250]
136	[266, 267]	648	[1084, 1085]	1160	[1625, 1626]	1672	[424, 282]
137	[268, 269]	649	[947, 1086]	1161	[1627, 1422]	1673	[1696, 815]
138	[270, 271]	650	[1087, 876]	1162	[52, 1280]	1674	[1108, 1109]

139	[272, 273]	651	[440, 1088]	1163	[507, 227]	1675	[1867, 944]
140	[274, 275]	652	[1089, 1090]	1164	[654, 1383]	1676	[1733, 1157]
141	[276, 277]	653	[831, 910]	1165	[1393, 1628]	1677	[1735, 966]
142	[278, 279]	654	[1091, 264]	1166	[1507, 1431]	1678	[1790, 1698]
143	[280, 281]	655	[1092, 1093]	1167	[1629, 666]	1679	[1929, 308]
144	[282, 283]	656	[1094, 1095]	1168	[1630, 1631]	1680	[1045, 1857]
145	[284, 285]	657	[339, 1096]	1169	[234, 1417]	1681	[1930, 1833]
146	[286, 287]	658	[835, 1097]	1170	[1382, 1632]	1682	[1830, 1807]
147	[288, 289]	659	[1098, 1099]	1171	[1626, 780]	1683	[1927, 361]
148	[290, 291]	660	[1100, 1101]	1172	[1633, 1634]	1684	[911, 883]
149	[275, 292]	661	[317, 295]	1173	[1593, 1609]	1685	[364, 1217]
150	[293, 294]	662	[1090, 1102]	1174	[713, 1550]	1686	[366, 413]
151	[295, 296]	663	[1103, 385]	1175	[1635, 1636]	1687	[1861, 1146]
152	[297, 298]	664	[927, 1104]	1176	[1637, 1433]	1688	[1119, 1895]
153	[299, 300]	665	[1105, 1087]	1177	[1638, 1639]	1689	[331, 1120]
154	[301, 302]	666	[945, 1106]	1178	[1640, 1534]	1690	[1806, 1253]
155	[303, 304]	667	[1107, 1108]	1179	[1641, 1617]	1691	[300, 1849]
156	[305, 280]	668	[1109, 901]	1180	[1642, 1643]	1692	[1104, 818]
157	[306, 307]	669	[1110, 1111]	1181	[1297, 607]	1693	[1931, 1073]
158	[92, 252]	670	[879, 358]	1182	[1644, 1519]	1694	[1932, 233]
159	[308, 309]	671	[22, 1053]	1183	[1645, 1541]	1695	[196, 692]
160	[310, 311]	672	[1112, 1002]	1184	[1646, 1647]	1696	[466, 1286]
161	[312, 313]	673	[898, 1113]	1185	[132, 1648]	1697	[1933, 169]
162	[314, 315]	674	[1076, 1114]	1186	[1649, 1404]	1698	[479, 1570]
163	[316, 317]	675	[941, 415]	1187	[1476, 1641]	1699	[1378, 1411]
164	[318, 319]	676	[399, 1030]	1188	[1650, 1645]	1700	[1621, 1311]
165	[320, 321]	677	[1115, 1116]	1189	[599, 1651]	1701	[1934, 1935]
166	[322, 323]	678	[426, 1117]	1190	[1652, 535]	1702	[1936, 1567]
167	[324, 325]	679	[1118, 1119]	1191	[1653, 1630]	1703	[1416, 1466]
168	[326, 75]	680	[1120, 1121]	1192	[1434, 1421]	1704	[1326, 803]
169	[327, 328]	681	[1122, 1123]	1193	[1555, 1654]	1705	[156, 1665]
170	[68, 329]	682	[1035, 1124]	1194	[1368, 1655]	1706	[1601, 1578]
171	[330, 331]	683	[812, 892]	1195	[1309, 735]	1707	[1628, 583]
172	[332, 333]	684	[1125, 1126]	1196	[1656, 1627]	1708	[10, 1937]
173	[334, 335]	685	[1127, 1128]	1197	[1657, 1622]	1709	[645, 1938]
174	[336, 337]	686	[462, 1129]	1198	[1658, 1313]	1710	[1557, 773]
175	[338, 339]	687	[1130, 1131]	1199	[1279, 1659]	1711	[1939, 61]
176	[340, 341]	688	[1132, 1133]	1200	[787, 1660]	1712	[602, 1562]
177	[342, 343]	689	[313, 441]	1201	[1613, 1506]	1713	[1463, 1678]
178	[344, 345]	690	[1029, 1134]	1202	[1398, 1544]	1714	[513, 1940]
179	[346, 347]	691	[1126, 1135]	1203	[1661, 601]	1715	[1672, 178]
180	[348, 349]	692	[1136, 1137]	1204	[624, 1662]	1716	[1941, 1599]
181	[350, 79]	693	[1138, 1139]	1205	[1663, 1508]	1717	[1495, 1308]
182	[351, 352]	694	[1140, 871]	1206	[549, 1664]	1718	[1942, 1943]

183	[353, 354]	695	[1141, 1142]	1207	[710, 1573]	1719	[528, 575]
184	[355, 356]	696	[856, 1143]	1208	[1665, 1498]	1720	[1262, 1944]
185	[287, 357]	697	[1065, 1122]	1209	[1666, 1667]	1721	[1623, 1571]
186	[358, 25]	698	[1144, 1084]	1210	[1668, 1669]	1722	[1945, 1403]
187	[90, 359]	699	[376, 1145]	1211	[1654, 1292]	1723	[1605, 531]
188	[66, 360]	700	[1146, 1006]	1212	[1670, 1671]	1724	[728, 1437]
189	[361, 362]	701	[1147, 1010]	1213	[36, 555]	1725	[1662, 1470]
190	[363, 364]	702	[1148, 886]	1214	[619, 57]	1726	[1387, 754]
191	[365, 366]	703	[447, 1149]	1215	[1418, 1672]	1727	[1943, 1472]
192	[367, 368]	704	[1150, 1151]	1216	[1420, 1673]	1728	[707, 225]
193	[369, 370]	705	[1152, 1153]	1217	[1474, 770]	1729	[1946, 657]
194	[371, 372]	706	[1154, 446]	1218	[1376, 1413]	1730	[771, 223]
195	[373, 374]	707	[428, 1155]	1219	[545, 1663]	1731	[1947, 1948]
196	[375, 376]	708	[26, 1156]	1220	[1517, 1528]	1732	[1949, 1390]
197	[377, 378]	709	[1157, 1158]	1221	[1343, 796]	1733	[58, 675]
198	[379, 380]	710	[64, 1159]	1222	[1659, 1372]	1734	[626, 1588]
199	[381, 382]	711	[1160, 1127]	1223	[1366, 1670]	1735	[1385, 1575]
200	[383, 384]	712	[1117, 1061]	1224	[1674, 229]	1736	[1950, 720]
201	[385, 386]	713	[1161, 1162]	1225	[1675, 1480]	1737	[1502, 215]
202	[387, 388]	714	[1163, 1164]	1226	[1676, 1677]	1738	[1951, 1299]
203	[389, 326]	715	[1165, 1166]	1227	[1678, 1468]	1739	[783, 1290]
204	[390, 348]	716	[1162, 379]	1228	[1619, 1646]	1740	[1380, 1478]
205	[391, 392]	717	[1167, 1168]	1229	[1679, 1263]	1741	[1594, 1952]
206	[16, 393]	718	[1169, 888]	1230	[1405, 791]	1742	[684, 8]
207	[394, 395]	719	[1155, 919]	1231	[1427, 1680]	1743	[1953, 1936]
208	[396, 397]	720	[930, 1170]	1232	[576, 1577]	1744	[192, 1950]
209	[398, 399]	721	[1171, 1172]	1233	[1681, 1465]	1745	[1556, 1954]
210	[400, 401]	722	[891, 1115]	1234	[1682, 1394]	1746	[612, 1459]
211	[402, 286]	723	[1173, 1174]	1235	[1683, 128]	1747	[1598, 1637]
212	[403, 404]	724	[1175, 1176]	1236	[1684, 1487]	1748	[804, 726]
213	[405, 406]	725	[1177, 412]	1237	[1685, 193]	1749	[1336, 480]
214	[407, 408]	726	[1178, 1044]	1238	[151, 182]	1750	[1948, 1276]
215	[409, 121]	727	[1179, 1180]	1239	[1612, 756]	1751	[50, 1947]
216	[410, 411]	728	[1181, 1182]	1240	[1634, 1303]	1752	[1473, 1689]
217	[412, 299]	729	[1143, 1183]	1241	[168, 1676]	1753	[1329, 543]
218	[413, 414]	730	[1184, 1150]	1242	[1527, 1620]	1754	[1955, 759]
219	[415, 17]	731	[1185, 1186]	1243	[1686, 217]	1755	[590, 1956]
220	[416, 417]	732	[1187, 1188]	1244	[1687, 1449]	1756	[190, 1957]
221	[418, 111]	733	[914, 1189]	1245	[712, 1688]	1757	[1596, 1318]
222	[419, 420]	734	[1190, 1191]	1246	[1515, 1581]	1758	[1597, 495]
223	[421, 371]	735	[356, 997]	1247	[570, 1521]	1759	[1335, 1488]
224	[345, 422]	736	[70, 266]	1248	[1331, 1362]	1760	[1312, 1955]
225	[423, 424]	737	[1106, 1192]	1249	[1584, 1537]	1761	[793, 1958]
226	[425, 426]	738	[1060, 405]	1250	[737, 1321]	1762	[1414, 508]

227	[427, 428]	739	[1193, 1194]	1251	[1689, 679]	1763	[1959, 1960]
228	[429, 430]	740	[1195, 409]	1252	[695, 1538]	1764	[1532, 703]
229	[431, 432]	741	[1196, 1197]	1253	[1549, 219]	1765	[767, 1320]
230	[433, 434]	742	[1198, 381]	1254	[1690, 1509]	1766	[1961, 1656]
231	[4, 105]	743	[814, 421]	1255	[1691, 1675]	1767	[697, 1962]
232	[435, 436]	744	[1197, 1161]	1256	[1522, 1692]	1768	[1533, 1614]
233	[437, 438]	745	[1199, 931]	1257	[1693, 641]	1769	[1337, 1386]
234	[439, 440]	746	[1200, 1201]	1258	[174, 577]	1770	[1426, 1963]
235	[441, 442]	747	[1202, 1203]	1259	[660, 1666]	1771	[1964, 1477]
236	[443, 284]	748	[1204, 973]	1260	[1332, 1616]	1772	[1935, 1589]
237	[444, 445]	749	[104, 1205]	1261	[1694, 1254]	1773	[1600, 1652]
238	[446, 447]	750	[328, 1107]	1262	[928, 1695]	1774	[1281, 43]
239	[448, 449]	751	[1037, 1206]	1263	[1027, 268]	1775	[176, 1300]
240	[450, 451]	752	[1207, 1089]	1264	[249, 1696]	1776	[1960, 639]
241	[452, 453]	753	[1208, 978]	1265	[1237, 1697]	1777	[1669, 1965]
242	[454, 455]	754	[1206, 830]	1266	[1698, 976]	1778	[1956, 1661]
243	[456, 262]	755	[1209, 1210]	1267	[956, 21]	1779	[1966, 1690]
244	[457, 458]	756	[1211, 857]	1268	[1699, 1700]	1780	[1352, 476]
245	[459, 460]	757	[1212, 1213]	1269	[401, 290]	1781	[642, 1554]
246	[461, 462]	758	[1191, 1167]	1270	[1701, 1702]	1782	[628, 1967]
247	[463, 464]	759	[122, 1214]	1271	[442, 813]	1783	[1587, 704]
248	[465, 466]	760	[1215, 1216]	1272	[1703, 1704]	1784	[699, 1278]
249	[467, 468]	761	[1217, 437]	1273	[1233, 981]	1785	[1647, 698]
250	[469, 470]	762	[903, 1048]	1274	[432, 1169]	1786	[1275, 53]
251	[471, 472]	763	[1218, 1212]	1275	[875, 431]	1787	[1968, 466]
252	[473, 474]	764	[1113, 1165]	1276	[1705, 1706]	1788	[1283, 1266]
253	[214, 475]	765	[438, 1219]	1277	[1707, 314]	1789	[1969, 1657]
254	[476, 477]	766	[1220, 1215]	1278	[1708, 878]	1790	[614, 1970]
255	[478, 479]	767	[1158, 1014]	1279	[1709, 1710]	1791	[1965, 180]
256	[480, 481]	768	[1221, 1222]	1280	[1711, 1712]	1792	[1608, 613]
257	[482, 483]	769	[961, 962]	1281	[1713, 1714]	1793	[1545, 1439]
258	[484, 485]	770	[1223, 1224]	1282	[1715, 902]	1794	[1586, 1934]
259	[486, 487]	771	[1225, 968]	1283	[1716, 1717]	1795	[1971, 553]
260	[216, 488]	772	[1226, 1227]	1284	[1032, 1256]	1796	[1954, 1524]
261	[489, 490]	773	[1228, 1229]	1285	[1718, 1719]	1797	[1364, 1968]
262	[491, 492]	774	[1230, 452]	1286	[808, 1720]	1798	[1568, 1972]
263	[493, 494]	775	[436, 1040]	1287	[1721, 1105]	1799	[1973, 1679]
264	[495, 496]	776	[1231, 1232]	1288	[1722, 1046]	1800	[1379, 694]
265	[497, 498]	777	[118, 1233]	1289	[1714, 254]	1801	[1643, 1425]
266	[499, 500]	778	[1234, 906]	1290	[1723, 402]	1802	[1963, 778]
267	[142, 501]	779	[1235, 924]	1291	[1724, 1725]	1803	[542, 1658]
268	[481, 502]	780	[1088, 316]	1292	[979, 1251]	1804	[1664, 1402]
269	[503, 504]	781	[1236, 1237]	1293	[414, 1726]	1805	[572, 1974]
270	[2, 505]	782	[953, 1238]	1294	[1727, 985]	1806	[1636, 1629]

271	[506, 507]	783	[1139, 1239]	1295	[1728, 1729]	1807	[1974, 1975]
272	[508, 509]	784	[1133, 1092]	1296	[1013, 1022]	1808	[1976, 1945]
273	[510, 511]	785	[1240, 1241]	1297	[1730, 419]	1809	[1688, 701]
274	[512, 513]	786	[822, 312]	1298	[1731, 1732]	1810	[1970, 1977]
275	[514, 515]	787	[296, 1242]	1299	[74, 1195]	1811	[158, 1381]
276	[490, 516]	788	[1243, 418]	1300	[1015, 1733]	1812	[1978, 604]
277	[517, 518]	789	[1244, 1148]	1301	[341, 1734]	1813	[658, 1590]
278	[519, 152]	790	[309, 1245]	1302	[1697, 1735]	1814	[1451, 1979]
279	[138, 520]	791	[1246, 1100]	1303	[269, 1244]	1815	[1452, 1980]
280	[203, 521]	792	[1247, 940]	1304	[1736, 1737]	1816	[1938, 1576]
281	[522, 523]	793	[980, 1154]	1305	[1738, 863]	1817	[1981, 1582]
282	[524, 525]	794	[860, 1248]	1306	[1097, 1181]	1818	[597, 1580]
283	[526, 163]	795	[1249, 916]	1307	[1700, 403]	1819	[1430, 1951]
284	[527, 528]	796	[1250, 853]	1308	[98, 1193]	1820	[1673, 1268]
285	[529, 530]	797	[1251, 373]	1309	[354, 1709]	1821	[1579, 1323]
286	[531, 532]	798	[1205, 1252]	1310	[291, 1739]	1822	[532, 1611]
287	[533, 534]	799	[1253, 288]	1311	[1740, 1741]	1823	[1294, 581]
288	[535, 536]	800	[972, 1254]	1312	[1742, 1004]	1824	[1490, 633]
289	[537, 538]	801	[315, 964]	1313	[337, 1125]	1825	[1982, 1983]
290	[539, 540]	802	[925, 983]	1314	[1743, 1701]	1826	[492, 1650]
291	[541, 542]	803	[1255, 874]	1315	[1744, 1745]	1827	[1680, 1644]
292	[543, 544]	804	[1256, 1257]	1316	[843, 1031]	1828	[1651, 1388]
293	[44, 545]	805	[1258, 1079]	1317	[1085, 1243]	1829	[1561, 1267]
294	[546, 547]	806	[1259, 1260]	1318	[333, 1746]	1830	[500, 1976]
295	[548, 549]	807	[1261, 1262]	1319	[1747, 1175]	1831	[724, 1392]
296	[550, 551]	808	[1263, 159]	1320	[349, 1748]	1832	[1419, 1410]
297	[162, 552]	809	[1264, 743]	1321	[265, 1749]	1833	[1944, 1685]
298	[553, 554]	810	[1265, 648]	1322	[1192, 351]	1834	[1287, 1984]
299	[555, 556]	811	[1266, 47]	1323	[1750, 1018]	1835	[153, 1985]
300	[557, 558]	812	[1267, 45]	1324	[1751, 1716]	1836	[46, 239]
301	[559, 560]	813	[1268, 630]	1325	[335, 125]	1837	[494, 799]
302	[561, 562]	814	[777, 1269]	1326	[1752, 1753]	1838	[1983, 609]
303	[563, 51]	815	[1270, 484]	1327	[106, 101]	1839	[1520, 1277]
304	[564, 565]	816	[1271, 467]	1328	[952, 923]	1840	[1606, 503]
305	[566, 567]	817	[1272, 1273]	1329	[1754, 869]	1841	[1979, 1941]
306	[179, 568]	818	[1274, 717]	1330	[1755, 1756]	1842	[1980, 1330]
307	[569, 570]	819	[682, 606]	1331	[1757, 1758]	1843	[1977, 13]
308	[571, 572]	820	[472, 209]	1332	[281, 1033]	1844	[1940, 1444]
309	[573, 574]	821	[1273, 578]	1333	[1129, 394]	1845	[1975, 1445]
310	[575, 576]	822	[521, 1275]	1334	[1753, 1713]	1846	[1324, 784]
311	[577, 231]	823	[1276, 204]	1335	[1759, 346]	1847	[1615, 1649]
312	[578, 579]	824	[1277, 161]	1336	[996, 832]	1848	[608, 1635]
313	[199, 580]	825	[1278, 1279]	1337	[848, 1760]	1849	[556, 1981]
314	[581, 582]	826	[1280, 1281]	1338	[1059, 1761]	1850	[1986, 1583]

315	[583, 584]	827	[1282, 1283]	1339	[1762, 1721]	1851	[1453, 1355]
316	[585, 586]	828	[1284, 1285]	1340	[1153, 1228]	1852	[536, 1603]
317	[587, 588]	829	[1286, 1287]	1341	[1763, 1764]	1853	[525, 673]
318	[589, 590]	830	[1288, 1289]	1342	[1765, 1250]	1854	[1551, 1397]
319	[591, 592]	831	[1290, 1291]	1343	[1766, 1140]	1855	[1692, 1987]
320	[593, 594]	832	[1292, 1265]	1344	[255, 1196]	1856	[12, 1686]
321	[164, 595]	833	[1293, 1294]	1345	[1238, 915]	1857	[592, 1350]
322	[596, 597]	834	[511, 1295]	1346	[420, 1767]	1858	[1988, 1370]
323	[598, 599]	835	[1296, 1297]	1347	[1166, 1141]	1859	[1536, 1569]
324	[600, 37]	836	[1298, 789]	1348	[1241, 840]	1860	[1984, 665]
325	[601, 602]	837	[1299, 148]	1349	[887, 1711]	1861	[1985, 1691]
326	[603, 139]	838	[1300, 1301]	1350	[1710, 457]	1862	[1958, 706]
327	[604, 605]	839	[558, 1302]	1351	[1768, 1769]	1863	[1542, 1624]
328	[606, 557]	840	[1303, 1298]	1352	[1748, 23]	1864	[1539, 1262]
329	[607, 608]	841	[1304, 1305]	1353	[896, 1770]	1865	[1667, 1989]
330	[609, 610]	842	[1306, 768]	1354	[1219, 305]	1866	[687, 1333]
331	[505, 611]	843	[800, 1307]	1355	[1771, 327]	1867	[1547, 1978]
332	[144, 612]	844	[1308, 616]	1356	[120, 942]	1868	[727, 622]
333	[613, 614]	845	[1289, 1309]	1357	[1772, 1773]	1869	[580, 802]
334	[247, 615]	846	[744, 1310]	1358	[445, 1774]	1870	[1429, 1942]
335	[616, 617]	847	[1311, 1312]	1359	[386, 322]	1871	[1483, 1638]
336	[618, 619]	848	[1313, 189]	1360	[24, 1775]	1872	[785, 1347]
337	[620, 621]	849	[1314, 1315]	1361	[1776, 1777]	1873	[48, 1591]
338	[622, 486]	850	[1316, 1317]	1362	[1756, 1778]	1874	[1610, 564]
339	[623, 624]	851	[636, 696]	1363	[251, 819]	1875	[509, 167]
340	[625, 626]	852	[1318, 1319]	1364	[319, 1012]	1876	[1391, 1443]
341	[627, 628]	853	[1320, 603]	1365	[1137, 1779]	1877	[166, 1988]
342	[222, 629]	854	[1321, 1322]	1366	[1000, 1780]	1878	[574, 175]
343	[630, 631]	855	[1323, 1324]	1367	[1720, 1781]	1879	[1967, 1604]
344	[34, 632]	856	[1325, 1326]	1368	[1745, 1091]	1880	[1525, 1668]
345	[633, 634]	857	[1327, 792]	1369	[1782, 1783]	1881	[1989, 1973]
346	[496, 55]	858	[1328, 1329]	1370	[28, 1742]	1882	[1491, 1684]
347	[635, 636]	859	[1330, 1331]	1371	[1784, 1208]	1883	[520, 191]
348	[637, 638]	860	[1317, 1332]	1372	[1726, 1236]	1884	[1990, 1982]
349	[639, 640]	861	[1333, 1334]	1373	[1785, 1020]	1885	[1307, 478]
350	[641, 642]	862	[689, 213]	1374	[1057, 377]	1886	[1648, 1986]
351	[643, 241]	863	[147, 1335]	1375	[102, 1786]	1887	[1432, 625]
352	[644, 645]	864	[1305, 1336]	1376	[1787, 340]	1888	[662, 1682]
353	[646, 647]	865	[516, 1337]	1377	[1788, 1173]	1889	[1952, 1607]
354	[648, 649]	866	[1338, 1339]	1378	[1789, 1790]	1890	[1514, 1546]
355	[483, 650]	867	[788, 1340]	1379	[1791, 1792]	1891	[1400, 1447]
356	[651, 618]	868	[763, 1341]	1380	[1761, 1793]	1892	[502, 1687]
357	[652, 653]	869	[1342, 1343]	1381	[934, 1794]	1893	[130, 559]
358	[586, 654]	870	[1344, 1345]	1382	[977, 1171]	1894	[1302, 1642]

359	[655, 656]	871	[477, 1346]	1383	[1780, 1226]	1895	[1395, 1961]
360	[657, 658]	872	[1347, 1348]	1384	[1795, 1796]	1896	[1631, 1971]
361	[659, 660]	873	[769, 1349]	1385	[1797, 1798]	1897	[676, 1625]
362	[661, 662]	874	[1350, 473]	1386	[1222, 1754]	1898	[1512, 1966]
363	[523, 663]	875	[1351, 1352]	1387	[1799, 77]	1899	[1315, 1270]
364	[228, 664]	876	[1353, 748]	1388	[1011, 935]	1900	[1639, 721]
365	[665, 237]	877	[232, 1354]	1389	[1072, 1800]	1901	[649, 1674]
366	[666, 667]	878	[1355, 548]	1390	[1801, 1802]	1902	[1559, 1399]
367	[240, 591]	879	[54, 143]	1391	[1803, 1804]	1903	[1677, 1316]
368	[668, 669]	880	[1356, 1357]	1392	[1805, 811]	1904	[1389, 1969]
369	[670, 671]	881	[650, 589]	1393	[1176, 1806]	1905	[1671, 1683]
370	[672, 207]	882	[1358, 1359]	1394	[1102, 1081]	1906	[1937, 1338]
371	[673, 674]	883	[1360, 1361]	1395	[1807, 1808]	1907	[1565, 1991]
372	[675, 676]	884	[1362, 1363]	1396	[1809, 93]	1908	[1962, 1953]
373	[677, 678]	885	[621, 1364]	1397	[1210, 1776]	1909	[1497, 1633]
374	[679, 680]	886	[562, 1365]	1398	[1810, 1811]	1910	[1285, 1653]
375	[681, 682]	887	[750, 1366]	1399	[1812, 1813]	1911	[1992, 499]
376	[683, 684]	888	[762, 233]	1400	[1814, 1815]	1912	[1660, 243]
377	[194, 685]	889	[1367, 1368]	1401	[1816, 258]	1913	[632, 1526]
378	[686, 687]	890	[739, 1369]	1402	[110, 396]	1914	[245, 1964]
379	[688, 689]	891	[1370, 1282]	1403	[1798, 1771]	1915	[1618, 1408]
380	[690, 691]	892	[640, 1371]	1404	[1817, 350]	1916	[1987, 1959]
381	[692, 693]	893	[1372, 541]	1405	[1818, 1098]	1917	[1346, 1693]
382	[694, 695]	894	[1373, 1374]	1406	[1819, 334]	1918	[1511, 1946]
383	[696, 697]	895	[1375, 1376]	1407	[1080, 429]	1919	[1560, 1681]
384	[698, 699]	896	[1377, 1378]	1408	[1820, 463]	1920	[1972, 1933]
385	[700, 596]	897	[38, 1379]	1409	[982, 1247]	1921	[1494, 1949]
386	[701, 598]	898	[1339, 1380]	1410	[1821, 1184]	1922	[230, 1939]
387	[702, 49]	899	[1381, 1382]	1411	[304, 71]	1923	[1991, 1992]
388	[703, 522]	900	[1383, 772]	1412	[1792, 332]	1924	[629, 1990]
389	[704, 705]	901	[1384, 1385]	1413	[955, 826]	1925	[749, 668]
390	[706, 707]	902	[1386, 1387]	1414	[975, 1178]	1926	[1957, 1396]
391	[56, 708]	903	[1388, 646]	1415	[1062, 1822]	1927	[1632, 1640]
392	[487, 709]	904	[554, 1389]	1416	[1260, 1823]	1928	[1363, 471]
393	[32, 710]	905	[1390, 1391]	1417	[958, 933]	1929	[1424, 573]
394	[711, 712]	906	[1392, 1393]	1418	[1824, 344]	1930	[1655, 1531]
395	[160, 713]	907	[1394, 1395]	1419	[261, 1810]	1931	[568, 1558]
396	[183, 714]	908	[498, 794]	1420	[460, 1825]	1932	[1993, 439]
397	[631, 670]	909	[1396, 620]	1421	[263, 1826]	1933	[1172, 1705]
398	[715, 716]	910	[1397, 1360]	1422	[1827, 1828]	1934	[937, 1075]
399	[717, 718]	911	[1291, 211]	1423	[1829, 1830]	1935	[1909, 1147]
400	[719, 539]	912	[1369, 1398]	1424	[1746, 974]	1936	[88, 1872]
401	[720, 600]	913	[1399, 1400]	1425	[837, 123]	1937	[833, 1923]
402	[653, 533]	914	[731, 1401]	1426	[1831, 1234]	1938	[1884, 954]

403	[721, 715]	915	[617, 41]	1427	[1832, 995]	1939	[357, 1255]
404	[722, 561]	916	[1402, 1342]	1428	[1833, 1039]	1940	[1712, 1077]
405	[723, 724]	917	[1403, 491]	1429	[1834, 1835]	1941	[1848, 1144]
406	[220, 725]	918	[1404, 1405]	1430	[1836, 1067]	1942	[1758, 1795]
407	[726, 727]	919	[1406, 752]	1431	[1837, 439]	1943	[1835, 1860]
408	[567, 728]	920	[1407, 32]	1432	[1838, 1050]	1944	[1254, 119]
409	[206, 729]	921	[1408, 627]	1433	[1839, 1840]	1945	[864, 1759]
410	[730, 731]	922	[1334, 1409]	1434	[897, 1103]	1946	[86, 423]
411	[732, 672]	923	[1410, 677]	1435	[1777, 1728]	1947	[1719, 948]
412	[733, 734]	924	[1411, 593]	1436	[862, 318]	1948	[967, 1110]
413	[735, 736]	925	[1348, 1412]	1437	[963, 880]	1949	[1851, 1190]
414	[667, 737]	926	[1413, 1414]	1438	[292, 342]	1950	[1124, 1870]
415	[738, 739]	927	[758, 1274]	1439	[1841, 1842]	1951	[1216, 1715]
416	[740, 566]	928	[1415, 1416]	1440	[1725, 1727]	1952	[877, 1913]
417	[741, 742]	929	[1417, 683]	1441	[1843, 16]	1953	[1074, 1901]
418	[743, 537]	930	[515, 1418]	1442	[1844, 1845]	1954	[126, 1914]
419	[742, 744]	931	[1269, 1419]	1443	[1802, 938]	1955	[1741, 992]
420	[745, 746]	932	[1345, 1420]	1444	[1840, 99]	1956	[1994, 824]
421	[544, 747]	933	[1421, 1353]	1445	[1846, 1699]	1957	[362, 1259]
422	[748, 749]	934	[1422, 805]	1446	[1847, 1185]	1958	[1995, 1922]
423	[170, 750]	935	[1423, 150]	1447	[1131, 1042]	1959	[1996, 1994]
424	[610, 681]	936	[1401, 1424]	1448	[1815, 1841]	1960	[1822, 899]
425	[751, 200]	937	[1295, 173]	1449	[1123, 1772]	1961	[1239, 1763]
426	[752, 753]	938	[1425, 1426]	1450	[1174, 861]	1962	[18, 926]
427	[754, 755]	939	[218, 1427]	1451	[984, 1848]	1963	[434, 1924]
428	[756, 757]	940	[1428, 1429]	1452	[96, 1755]	1964	[458, 1996]
429	[185, 758]	941	[716, 655]	1453	[1808, 1160]	1965	[1926, 1246]
430	[759, 497]	942	[760, 1430]	1454	[1849, 1850]	1966	[1871, 1718]
431	[181, 760]	943	[1431, 1432]	1455	[1773, 1851]	1967	[1052, 1863]
432	[761, 762]	944	[1433, 585]	1456	[372, 1836]	1968	[1043, 83]
433	[714, 763]	945	[134, 1434]	1457	[932, 1036]	1969	[393, 1930]
434	[764, 141]	946	[242, 1435]	1458	[1852, 1130]	1970	[1214, 27]
435	[565, 765]	947	[746, 1436]	1459	[283, 1853]	1971	[1919, 1995]
436	[766, 767]	948	[1437, 1438]	1460	[1717, 1854]	1972	[989, 1997]
437	[768, 769]	949	[1412, 171]	1461	[451, 293]	1973	[1925, 1896]
438	[770, 771]	950	[474, 786]	1462	[1767, 1766]	1974	[1877, 817]
439	[772, 510]	951	[1439, 1440]	1463	[1850, 1855]	1975	[854, 1132]
440	[773, 774]	952	[154, 740]	1464	[1856, 1797]	1976	[1997, 1837]
441	[775, 776]	953	[671, 246]	1465	[76, 1834]	1977	[1878, 1931]
442	[210, 777]	954	[1441, 690]	1466	[991, 951]	1978	[1734, 1782]
443	[778, 529]	955	[801, 1442]	1467	[1857, 1723]	1979	[986, 994]
444	[779, 2]	956	[1443, 187]	1468	[1116, 1788]	1980	[1121, 1757]
445	[780, 781]	957	[1444, 644]	1469	[1858, 461]	1981	[943, 1819]
446	[782, 783]	958	[1445, 688]	1470	[1078, 834]	1982	[1056, 1026]

447	[784, 785]	959	[1446, 730]	1471	[1859, 895]	1983	[1182, 1028]
448	[786, 787]	960	[1447, 1448]	1472	[1114, 306]	1984	[1885, 1897]
449	[705, 788]	961	[560, 637]	1473	[1860, 1861]	1985	[298, 459]
450	[789, 790]	962	[1449, 1356]	1474	[1142, 1225]	1986	[1737, 1051]
451	[647, 546]	963	[1361, 1450]	1475	[411, 1818]	1987	[6, 1928]
452	[468, 651]	964	[582, 1451]	1476	[1854, 844]	1988	[321, 1998]
453	[791, 659]	965	[680, 1452]	1477	[868, 260]	1989	[1998, 1929]
454	[792, 793]	966	[1438, 1453]	1478	[810, 103]	1990	[827, 270]
455	[794, 795]	967	[1454, 1455]	1479	[1793, 1862]	1991	[1732, 1912]
456	[796, 493]	968	[1456, 145]	1480	[1863, 1736]	1992	[1778, 1890]
457	[797, 798]	969	[709, 766]	1481	[1825, 1864]	1993	[1999, 773]
458	[799, 800]	970	[547, 1384]	1482	[1170, 355]	1994	[1349, 1462]
459	[552, 801]	971	[615, 563]	1483	[397, 1784]	1995	[656, 1602]
460	[802, 137]	972	[1457, 1458]	1484	[1764, 1865]	1996	[798, 195]
461	[803, 804]	973	[485, 623]	1485	[1760, 990]	1997	[663, 1484]
462	[678, 711]	974	[501, 661]	1486	[1704, 320]	1998	[594, 571]
463	[805, 702]	975	[1459, 1284]	1487	[1095, 881]	1999	[2000, 1230]
464	[776, 806]	976	[488, 1460]	1488	[289, 1852]	2000	[2001, 468]
465	[807, 808]	977	[1435, 1461]	1489	[1866, 1136]	2001	[2002, 440]
466	[809, 810]	978	[1462, 1463]	1490	[1082, 1063]	2002	[2003, 1572]
467	[811, 812]	979	[40, 741]	1491	[464, 363]	2003	[2004, 900]
468	[813, 814]	980	[693, 782]	1492	[1252, 823]	2004	[2005, 224]
469	[815, 816]	981	[1464, 184]	1493	[1064, 1867]	2005	[2006, 1217]
470	[817, 297]	982	[1465, 1428]	1494	[1770, 1801]	2006	[2007, 768]
471	[818, 398]	983	[1466, 1467]	1495	[1229, 1038]	2007	[2008, 961]
472	[819, 820]	984	[1468, 1469]	1496	[825, 81]	2008	[2009, 1449]
473	[821, 822]	985	[1470, 1471]	1497	[1868, 1724]	2009	[2010, 120]
474	[823, 353]	986	[1472, 1473]	1498	[108, 1869]	2010	[2011, 760]
475	[824, 825]	987	[212, 146]	1499	[1870, 1871]	2011	[2012, 1836]
476	[826, 827]	988	[588, 1474]	1500	[404, 1249]	2012	[2013, 1486]
477	[100, 29]	989	[1475, 1476]	1501	[382, 1071]	2013	[2014, 1722]
478	[828, 829]	990	[1371, 1373]	1502	[1203, 1055]	2014	[2015, 1365]
479	[388, 407]	991	[1477, 779]	1503	[1872, 1873]	2015	[2016, 1786]
480	[830, 831]	992	[1478, 1479]	1504	[1874, 303]	2016	[2017, 507]
481	[832, 833]	993	[685, 1271]	1505	[1695, 1179]	2017	[2018, 427]
482	[834, 835]	994	[1471, 482]	1506	[1086, 1785]	2018	[2019, 756]
483	[836, 837]	995	[1480, 1328]	1507	[1875, 1876]	2019	[2020, 1212]
484	[838, 839]	996	[1440, 1293]	1508	[1135, 1240]	2020	[2021, 36]
485	[840, 841]	997	[1481, 1482]	1509	[1853, 1199]	2021	[2022, 942]
486	[842, 843]	998	[781, 1483]	1510	[124, 65]	2022	[2023, 1431]
487	[844, 845]	999	[224, 761]	1511	[84, 1877]	2023	[2024, 1838]
488	[347, 367]	1000	[1484, 1304]	1512	[1869, 987]	2024	[2025, 1530]
489	[384, 846]	1001	[1485, 1486]	1513	[1828, 89]	2025	[2026, 1248]
490	[847, 848]	1002	[1487, 512]	1514	[1245, 1878]	2026	[2027, 662]

491	[849, 850]	1003	[1488, 1457]	1515	[1826, 1187]	2027	[2028, 1830]
492	[851, 852]	1004	[1489, 1490]	1516	[1811, 1843]	2028	[2029, 1974]
493	[78, 444]	1005	[1409, 1327]	1517	[1879, 389]	2029	[2030, 854]
494	[853, 854]	1006	[534, 1491]	1518	[271, 1094]	2030	[2031, 1604]
495	[855, 856]	1007	[1492, 1493]	1519	[1823, 1707]	2031	[2032, 1849]
496	[857, 858]	1008	[1455, 1494]	1520	[1880, 1881]	2032	[2033, 1986]
497	[859, 860]	1009	[806, 1495]	1521	[858, 1752]	2033	[2034, 1706]
498	[352, 450]	1010	[1461, 1423]	1522	[1149, 1258]	2034	[2035, 670]
499	[861, 862]	1011	[1496, 1497]	1523	[1882, 1765]	2035	[2036, 22]
500	[863, 864]	1012	[188, 11]	1524	[894, 324]	2036	[2037, 790]
501	[277, 865]	1013	[1498, 1499]	1525	[907, 1740]	2037	[2038, 1828]
502	[422, 365]	1014	[1500, 1489]	1526	[257, 1220]	2038	[2039, 177]
503	[866, 867]	1015	[1501, 1502]	1527	[1855, 1762]	2039	[2040, 71]
504	[343, 868]	1016	[729, 1503]	1528	[1702, 1747]	2040	[2041, 145]
505	[869, 870]	1017	[1504, 1505]	1529	[1007, 1882]	2041	[2042, 79]
506	[871, 115]	1018	[1506, 1507]	1530	[1232, 936]	2042	[2043, 159]
507	[872, 64]	1019	[1508, 745]	1531	[1800, 847]	2043	[2044, 310]
508	[873, 842]	1020	[1509, 1510]	1532	[1883, 1884]	2044	[1, 577]
509	[874, 875]	1021	[1319, 723]	1533	[1224, 1231]		
510	[876, 877]	1022	[42, 1511]	1534	[1001, 1885]		
511	[878, 879]	1023	[1499, 1512]	1535	[1886, 838]		

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	341	0	682	0	1023	0	1364	0	1705	1
1	0	342	1	683	0	1024	0	1365	0	1706	1
2	0	343	1	684	1	1025	0	1366	1	1707	0
3	0	344	0	685	1	1026	1	1367	1	1708	1
4	0	345	0	686	0	1027	1	1368	1	1709	1
5	0	346	0	687	1	1028	0	1369	0	1710	1
6	0	347	0	688	0	1029	0	1370	1	1711	1
7	0	348	1	689	1	1030	0	1371	0	1712	0
8	1	349	1	690	0	1031	0	1372	0	1713	1
9	0	350	1	691	0	1032	1	1373	1	1714	0
10	1	351	1	692	1	1033	1	1374	0	1715	0
11	0	352	0	693	0	1034	1	1375	1	1716	0
12	1	353	0	694	0	1035	0	1376	1	1717	0
13	0	354	1	695	1	1036	1	1377	0	1718	1
14	1	355	1	696	1	1037	0	1378	1	1719	1
15	0	356	1	697	0	1038	1	1379	1	1720	1
16	1	357	1	698	0	1039	1	1380	0	1721	0
17	1	358	0	699	0	1040	1	1381	1	1722	1
18	1	359	0	700	0	1041	1	1382	1	1723	0
19	0	360	0	701	0	1042	0	1383	1	1724	1

20	0	361	0	702	1	1043	1	1384	1	1725	0
21	1	362	1	703	1	1044	0	1385	0	1726	0
22	1	363	0	704	1	1045	1	1386	1	1727	0
23	0	364	1	705	0	1046	0	1387	0	1728	0
24	0	365	1	706	0	1047	0	1388	1	1729	1
25	1	366	0	707	0	1048	0	1389	0	1730	1
26	1	367	1	708	1	1049	1	1390	0	1731	1
27	0	368	1	709	0	1050	0	1391	1	1732	1
28	1	369	1	710	0	1051	0	1392	1	1733	1
29	1	370	0	711	0	1052	1	1393	1	1734	0
30	1	371	1	712	0	1053	0	1394	1	1735	0
31	0	372	1	713	0	1054	0	1395	1	1736	1
32	1	373	0	714	1	1055	0	1396	1	1737	1
33	1	374	1	715	1	1056	0	1397	0	1738	1
34	0	375	0	716	1	1057	0	1398	0	1739	0
35	1	376	0	717	1	1058	1	1399	0	1740	0
36	0	377	1	718	1	1059	0	1400	0	1741	1
37	1	378	0	719	0	1060	1	1401	0	1742	1
38	1	379	0	720	0	1061	0	1402	1	1743	0
39	0	380	0	721	1	1062	1	1403	0	1744	1
40	1	381	1	722	1	1063	0	1404	1	1745	1
41	0	382	0	723	1	1064	1	1405	0	1746	0
42	0	383	1	724	0	1065	0	1406	1	1747	0
43	1	384	0	725	0	1066	0	1407	1	1748	1
44	1	385	0	726	0	1067	0	1408	1	1749	0
45	1	386	0	727	1	1068	1	1409	0	1750	1
46	1	387	1	728	1	1069	1	1410	1	1751	0
47	0	388	1	729	0	1070	0	1411	1	1752	0
48	1	389	1	730	1	1071	1	1412	0	1753	1
49	0	390	0	731	0	1072	0	1413	1	1754	1
50	0	391	0	732	1	1073	1	1414	1	1755	0
51	1	392	1	733	0	1074	0	1415	1	1756	0
52	1	393	1	734	0	1075	1	1416	1	1757	1
53	1	394	0	735	1	1076	0	1417	0	1758	1
54	1	395	0	736	0	1077	0	1418	0	1759	1
55	0	396	0	737	0	1078	0	1419	0	1760	1
56	0	397	1	738	1	1079	1	1420	1	1761	0
57	1	398	1	739	1	1080	1	1421	1	1762	1
58	1	399	1	740	1	1081	0	1422	1	1763	1
59	1	400	0	741	0	1082	0	1423	1	1764	1
60	1	401	0	742	1	1083	0	1424	0	1765	0
61	1	402	0	743	0	1084	1	1425	1	1766	1
62	0	403	1	744	1	1085	1	1426	0	1767	0
63	0	404	1	745	1	1086	0	1427	0	1768	0

64	0	405	1	746	1	1087	0	1428	0	1769	1
65	1	406	1	747	0	1088	1	1429	0	1770	0
66	1	407	0	748	1	1089	1	1430	1	1771	0
67	1	408	0	749	0	1090	0	1431	1	1772	1
68	1	409	1	750	0	1091	0	1432	0	1773	0
69	0	410	1	751	0	1092	0	1433	1	1774	1
70	0	411	1	752	0	1093	1	1434	1	1775	0
71	1	412	0	753	0	1094	1	1435	1	1776	0
72	1	413	1	754	0	1095	0	1436	1	1777	1
73	0	414	0	755	1	1096	0	1437	0	1778	0
74	1	415	1	756	0	1097	1	1438	1	1779	1
75	1	416	1	757	0	1098	0	1439	0	1780	1
76	0	417	0	758	0	1099	1	1440	0	1781	1
77	1	418	0	759	0	1100	0	1441	1	1782	0
78	1	419	1	760	0	1101	0	1442	0	1783	0
79	0	420	1	761	0	1102	1	1443	0	1784	0
80	0	421	1	762	1	1103	1	1444	1	1785	1
81	1	422	1	763	1	1104	1	1445	0	1786	0
82	0	423	1	764	0	1105	1	1446	0	1787	1
83	0	424	0	765	1	1106	0	1447	0	1788	0
84	1	425	0	766	1	1107	0	1448	0	1789	1
85	0	426	0	767	0	1108	0	1449	0	1790	1
86	1	427	0	768	1	1109	1	1450	0	1791	1
87	1	428	0	769	0	1110	1	1451	0	1792	0
88	0	429	1	770	1	1111	0	1452	0	1793	0
89	1	430	0	771	1	1112	0	1453	1	1794	0
90	0	431	1	772	1	1113	0	1454	1	1795	1
91	1	432	0	773	1	1114	0	1455	0	1796	1
92	1	433	1	774	0	1115	0	1456	1	1797	0
93	1	434	0	775	1	1116	0	1457	1	1798	0
94	0	435	0	776	0	1117	0	1458	0	1799	0
95	0	436	1	777	0	1118	1	1459	1	1800	1
96	0	437	1	778	0	1119	1	1460	0	1801	0
97	1	438	1	779	1	1120	0	1461	0	1802	0
98	1	439	1	780	1	1121	0	1462	0	1803	1
99	0	440	1	781	1	1122	0	1463	1	1804	1
100	1	441	1	782	1	1123	0	1464	1	1805	1
101	0	442	0	783	0	1124	1	1465	0	1806	0
102	1	443	0	784	1	1125	1	1466	1	1807	1
103	1	444	1	785	0	1126	0	1467	1	1808	1
104	0	445	1	786	0	1127	1	1468	0	1809	1
105	1	446	1	787	1	1128	0	1469	0	1810	0
106	0	447	1	788	0	1129	0	1470	0	1811	1
107	1	448	0	789	1	1130	1	1471	0	1812	0

108	0	449	0	790	0	1131	0	1472	0	1813	0
109	1	450	1	791	0	1132	0	1473	0	1814	0
110	1	451	0	792	1	1133	1	1474	0	1815	0
111	0	452	1	793	0	1134	0	1475	1	1816	0
112	1	453	0	794	1	1135	1	1476	1	1817	1
113	0	454	1	795	1	1136	1	1477	1	1818	0
114	1	455	1	796	0	1137	0	1478	1	1819	1
115	1	456	0	797	0	1138	0	1479	0	1820	1
116	0	457	0	798	1	1139	0	1480	0	1821	1
117	1	458	0	799	0	1140	0	1481	0	1822	0
118	0	459	0	800	1	1141	1	1482	1	1823	0
119	1	460	1	801	1	1142	0	1483	1	1824	0
120	1	461	1	802	1	1143	0	1484	1	1825	0
121	1	462	0	803	1	1144	0	1485	1	1826	0
122	0	463	1	804	1	1145	1	1486	0	1827	1
123	1	464	0	805	1	1146	0	1487	0	1828	0
124	0	465	0	806	0	1147	0	1488	0	1829	1
125	0	466	1	807	0	1148	1	1489	1	1830	0
126	1	467	1	808	1	1149	1	1490	0	1831	0
127	0	468	1	809	1	1150	1	1491	0	1832	0
128	0	469	0	810	1	1151	1	1492	1	1833	0
129	0	470	1	811	1	1152	0	1493	1	1834	0
130	1	471	0	812	0	1153	0	1494	0	1835	0
131	1	472	0	813	1	1154	0	1495	0	1836	1
132	0	473	0	814	0	1155	0	1496	1	1837	1
133	1	474	1	815	0	1156	1	1497	1	1838	0
134	0	475	0	816	0	1157	0	1498	0	1839	1
135	1	476	1	817	1	1158	0	1499	0	1840	1
136	0	477	1	818	0	1159	0	1500	1	1841	0
137	1	478	1	819	0	1160	0	1501	0	1842	0
138	0	479	1	820	0	1161	0	1502	1	1843	1
139	0	480	1	821	0	1162	1	1503	0	1844	0
140	1	481	1	822	0	1163	1	1504	0	1845	0
141	0	482	0	823	1	1164	0	1505	0	1846	0
142	1	483	1	824	0	1165	1	1506	0	1847	0
143	1	484	0	825	1	1166	1	1507	1	1848	0
144	0	485	0	826	1	1167	1	1508	1	1849	1
145	1	486	1	827	0	1168	0	1509	0	1850	1
146	0	487	1	828	1	1169	1	1510	0	1851	1
147	0	488	0	829	1	1170	1	1511	1	1852	0
148	1	489	0	830	1	1171	1	1512	1	1853	0
149	0	490	0	831	0	1172	0	1513	0	1854	1
150	1	491	0	832	1	1173	1	1514	0	1855	1
151	1	492	0	833	0	1174	0	1515	0	1856	1

152	0	493	1	834	0	1175	0	1516	1	1857	1
153	0	494	1	835	0	1176	1	1517	1	1858	0
154	0	495	1	836	1	1177	0	1518	1	1859	0
155	1	496	0	837	1	1178	0	1519	0	1860	0
156	1	497	0	838	0	1179	1	1520	1	1861	1
157	0	498	0	839	0	1180	0	1521	0	1862	1
158	1	499	0	840	0	1181	1	1522	1	1863	0
159	0	500	0	841	1	1182	0	1523	0	1864	1
160	0	501	1	842	1	1183	1	1524	1	1865	0
161	1	502	1	843	1	1184	1	1525	1	1866	1
162	0	503	0	844	1	1185	0	1526	0	1867	1
163	0	504	1	845	0	1186	0	1527	1	1868	1
164	0	505	0	846	1	1187	1	1528	0	1869	1
165	0	506	1	847	0	1188	1	1529	1	1870	0
166	1	507	1	848	1	1189	0	1530	0	1871	1
167	1	508	0	849	0	1190	0	1531	1	1872	0
168	1	509	1	850	1	1191	0	1532	1	1873	1
169	0	510	0	851	0	1192	1	1533	0	1874	0
170	1	511	0	852	1	1193	1	1534	1	1875	1
171	1	512	1	853	1	1194	1	1535	1	1876	1
172	0	513	0	854	0	1195	1	1536	0	1877	1
173	1	514	0	855	1	1196	0	1537	0	1878	1
174	1	515	0	856	1	1197	1	1538	1	1879	1
175	0	516	1	857	0	1198	1	1539	1	1880	1
176	0	517	1	858	0	1199	1	1540	1	1881	0
177	1	518	0	859	0	1200	1	1541	0	1882	0
178	0	519	1	860	1	1201	0	1542	0	1883	1
179	0	520	1	861	0	1202	0	1543	0	1884	0
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182	1	523	0	864	1	1205	1	1546	1	1887	0
183	0	524	0	865	1	1206	0	1547	1	1888	0
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185	1	526	1	867	0	1208	0	1549	0	1890	0
186	0	527	1	868	1	1209	1	1550	0	1891	0
187	0	528	1	869	0	1210	0	1551	1	1892	1
188	1	529	0	870	1	1211	0	1552	0	1893	1
189	0	530	1	871	1	1212	0	1553	1	1894	0
190	0	531	0	872	1	1213	0	1554	1	1895	1
191	1	532	0	873	0	1214	0	1555	1	1896	1
192	1	533	1	874	1	1215	0	1556	1	1897	1
193	1	534	0	875	0	1216	1	1557	1	1898	1
194	1	535	0	876	0	1217	0	1558	0	1899	1
195	0	536	0	877	0	1218	1	1559	0	1900	1

196	0	537	0	878	0	1219	1	1560	1	1901	1
197	1	538	1	879	1	1220	1	1561	1	1902	0
198	0	539	1	880	1	1221	1	1562	0	1903	0
199	1	540	1	881	0	1222	1	1563	1	1904	0
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201	0	542	1	883	0	1224	0	1565	1	1906	0
202	1	543	1	884	0	1225	1	1566	0	1907	1
203	1	544	1	885	0	1226	1	1567	1	1908	1
204	0	545	1	886	1	1227	1	1568	0	1909	1
205	0	546	0	887	0	1228	1	1569	1	1910	1
206	1	547	0	888	1	1229	0	1570	0	1911	0
207	0	548	1	889	1	1230	0	1571	0	1912	1
208	0	549	0	890	1	1231	0	1572	1	1913	0
209	1	550	1	891	1	1232	0	1573	0	1914	0
210	0	551	1	892	1	1233	0	1574	1	1915	0
211	0	552	0	893	0	1234	0	1575	0	1916	0
212	1	553	1	894	1	1235	1	1576	0	1917	1
213	1	554	0	895	1	1236	1	1577	1	1918	1
214	0	555	0	896	0	1237	1	1578	0	1919	1
215	1	556	1	897	1	1238	1	1579	1	1920	1
216	1	557	1	898	1	1239	1	1580	1	1921	0
217	0	558	0	899	1	1240	0	1581	0	1922	1
218	1	559	0	900	1	1241	1	1582	1	1923	1
219	1	560	0	901	1	1242	1	1583	1	1924	0
220	1	561	1	902	1	1243	0	1584	1	1925	0
221	0	562	1	903	1	1244	1	1585	1	1926	1
222	1	563	1	904	0	1245	0	1586	0	1927	1
223	1	564	1	905	0	1246	0	1587	0	1928	0
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225	1	566	1	907	1	1248	1	1589	1	1930	0
226	0	567	0	908	0	1249	1	1590	0	1931	0
227	0	568	0	909	1	1250	0	1591	0	1932	0
228	1	569	1	910	0	1251	0	1592	0	1933	0
229	1	570	1	911	1	1252	1	1593	1	1934	0
230	1	571	0	912	0	1253	0	1594	1	1935	1
231	0	572	1	913	0	1254	0	1595	1	1936	0
232	0	573	0	914	0	1255	1	1596	1	1937	0
233	1	574	1	915	0	1256	1	1597	1	1938	0
234	1	575	0	916	1	1257	0	1598	0	1939	1
235	1	576	0	917	0	1258	1	1599	0	1940	0
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237	1	578	1	919	1	1260	1	1601	1	1942	1
238	1	579	1	920	1	1261	0	1602	1	1943	0
239	0	580	1	921	1	1262	1	1603	0	1944	0

240	1	581	0	922	1	1263	1	1604	0	1945	1
241	1	582	0	923	1	1264	1	1605	0	1946	1
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244	0	585	0	926	1	1267	0	1608	0	1949	1
245	0	586	0	927	0	1268	1	1609	0	1950	1
246	1	587	1	928	1	1269	0	1610	0	1951	1
247	1	588	0	929	0	1270	0	1611	0	1952	0
248	0	589	0	930	0	1271	0	1612	1	1953	0
249	1	590	0	931	0	1272	1	1613	0	1954	1
250	0	591	0	932	1	1273	0	1614	0	1955	1
251	0	592	1	933	1	1274	0	1615	0	1956	0
252	0	593	0	934	1	1275	0	1616	1	1957	1
253	0	594	0	935	1	1276	1	1617	0	1958	1
254	1	595	1	936	0	1277	0	1618	0	1959	1
255	1	596	1	937	0	1278	1	1619	1	1960	0
256	1	597	0	938	1	1279	1	1620	0	1961	1
257	0	598	0	939	1	1280	1	1621	0	1962	1
258	0	599	0	940	0	1281	1	1622	1	1963	0
259	1	600	1	941	1	1282	0	1623	0	1964	0
260	1	601	0	942	0	1283	0	1624	0	1965	1
261	0	602	0	943	1	1284	1	1625	0	1966	1
262	0	603	1	944	1	1285	1	1626	1	1967	1
263	1	604	0	945	0	1286	1	1627	0	1968	1
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265	0	606	0	947	1	1288	1	1629	1	1970	0
266	0	607	0	948	0	1289	0	1630	0	1971	1
267	1	608	0	949	0	1290	0	1631	1	1972	1
268	1	609	1	950	1	1291	1	1632	1	1973	0
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270	0	611	0	952	0	1293	0	1634	0	1975	0
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272	0	613	1	954	1	1295	0	1636	0	1977	1
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275	0	616	1	957	1	1298	1	1639	1	1980	0
276	0	617	0	958	0	1299	1	1640	0	1981	1
277	1	618	1	959	0	1300	0	1641	1	1982	0
278	1	619	0	960	0	1301	0	1642	0	1983	0
279	0	620	1	961	0	1302	0	1643	0	1984	0
280	1	621	0	962	0	1303	0	1644	0	1985	1
281	1	622	0	963	0	1304	1	1645	1	1986	1
282	0	623	0	964	0	1305	1	1646	1	1987	0
283	1	624	1	965	0	1306	1	1647	1	1988	0

284	1	625	0	966	1	1307	0	1648	1	1989	0
285	0	626	0	967	1	1308	1	1649	0	1990	0
286	0	627	0	968	1	1309	1	1650	1	1991	1
287	1	628	0	969	0	1310	0	1651	0	1992	0
288	0	629	0	970	0	1311	0	1652	0	1993	0
289	0	630	1	971	1	1312	1	1653	0	1994	0
290	1	631	1	972	1	1313	1	1654	0	1995	1
291	0	632	0	973	0	1314	0	1655	0	1996	1
292	1	633	0	974	1	1315	1	1656	0	1997	1
293	1	634	0	975	1	1316	1	1657	1	1998	0
294	0	635	0	976	0	1317	1	1658	1	1999	0
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296	1	637	1	978	0	1319	0	1660	1	2001	0
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299	0	640	1	981	1	1322	1	1663	1	2004	0
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302	1	643	1	984	0	1325	1	1666	1	2007	0
303	1	644	0	985	0	1326	0	1667	0	2008	0
304	1	645	1	986	0	1327	0	1668	0	2009	0
305	1	646	0	987	1	1328	0	1669	1	2010	0
306	0	647	0	988	0	1329	1	1670	0	2011	0
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308	0	649	1	990	0	1331	1	1672	0	2013	0
309	0	650	0	991	1	1332	1	1673	1	2014	0
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311	0	652	1	993	1	1334	1	1675	1	2016	0
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314	0	655	0	996	0	1337	1	1678	1	2019	0
315	1	656	1	997	0	1338	0	1679	0	2020	0
316	0	657	0	998	1	1339	1	1680	1	2021	0
317	1	658	0	999	0	1340	0	1681	0	2022	0
318	0	659	0	1000	1	1341	1	1682	0	2023	0
319	0	660	0	1001	1	1342	0	1683	1	2024	0
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321	0	662	0	1003	0	1344	1	1685	1	2026	0
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323	0	664	0	1005	0	1346	1	1687	1	2028	0
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326	1	667	0	1008	0	1349	0	1690	0	2031	0
327	0	668	1	1009	0	1350	1	1691	1	2032	0

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330	1	671	1	1012	1	1353	0	1694	0	2035	0
331	0	672	0	1013	0	1354	1	1695	0	2036	0
332	0	673	1	1014	1	1355	0	1696	1	2037	0
333	1	674	0	1015	0	1356	1	1697	0	2038	0
334	1	675	1	1016	0	1357	1	1698	1	2039	0
335	1	676	1	1017	0	1358	1	1699	1	2040	0
336	1	677	0	1018	0	1359	0	1700	0	2041	0
337	1	678	0	1019	1	1360	0	1701	0	2042	0
338	0	679	1	1020	0	1361	0	1702	0	2043	0
339	0	680	0	1021	0	1362	0	1703	1	2044	0
340	0	681	0	1022	0	1363	0	1704	0		

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