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

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

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

$$\begin{aligned}
p_0(z)&=z^{15}+z^9+z^8+z^6+z^5+z^4+z^3+z^2+z+1,\\
p_1(z)&=z^{19}+z^{18}+z^{16}+z^{14}+z^{10}+z^8+z^7+z^5+z^4+z^3+z^2+z,\\
p_2(z)&=z^{20}+z^{18}+z^{16}+z^{14}+z^{12}+z^{10}+z^8+z^6+z^2+1,\\
p_3(z)&=z^{19}+z^{18}+z^{16}+z^{14}+z^{10}+z^8+z^7+z^5+z^4+z^3+z^2+z,\\
p_4(z)&=z^{18}+z^{15}+z^{14}+z^{12}+z^{10}+z^9+z^5+z^4+z^3+z+1,
\end{aligned}$$

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

$$\begin{aligned}
p_0(z)&=z^{16}+z^{15}+z^{12}+z^9+z^8+z^6+z^5+z^3+z^2+z+1,\\
p_1(z)&=z^{19}+z^{18}+z^{16}+z^{14}+z^{10}+z^8+z^7+z^5+z^4+z^3+z^2+z,\\
p_2(z)&=z^{20}+z^{18}+z^{16}+z^{14}+z^{12}+z^{10}+z^8+z^6+z^2+1,\\
p_3(z)&=z^{19}+z^{18}+z^{16}+z^{14}+z^{10}+z^8+z^7+z^5+z^4+z^3+z^2+z,\\
p_4(z)&=z^{18}+z^{16}+z^{15}+z^{14}+z^{10}+z^9+z^5+z^3+z+1.
\end{aligned}$$

2. Proof

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

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

By the basic properties of continued fractions, we have

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

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

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

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

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

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

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

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

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

for some positive integer d_n. Hence,

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

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

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

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

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

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

$$M^e[:10u] = M^e[:5u] + x^{5u}M^e[:5u] + x^{6u}M^e[:4u] + x^{7u}M^e[:3u] + x^{5u}R^e,$$
$$W^e[:10u] = W^e[:5u] + x^{5u}W^e[:5u] + x^{6u}W^e[:4u] + x^{7u}W^e[:3u] + x^{5u}R^e.$$

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

$$M^o[:10u] = M^o[:5u] + x^{5u}M^o[:5u] + x^{6u}M^o[:4u] + x^{7u}M^o[:3u] + x^{5u}R^o,$$
$$W^o[:10u] = W^o[:5u] + x^{5u}W^o[:5u] + x^{6u}W^o[:4u] + x^{7u}W^o[:3u] + x^{5u}R^o.$$

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 $u = 2^{2k}$,

$$T[:10u] = T[:5u] + x^{5u}T[:5u] + x^{6u}T[:4u] + x^{7u}T[:3u] + x^{5u}.$$

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

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

which can be rewritten as

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

$$0 = T[[w]_2] + T[[1w]_2] + T[[110w]_2], \tag{2.8}$$

$$0 = T[[w]_2] + T[[1w]_2] + T[[10w]_2] + T[[111w]_2], \tag{2.9}$$

$$0 = T[[1w]_2] + T[[10w]_2] + T[[11w]_2] + T[[1000w]_2], \tag{2.10}$$

$$0 = T[[10w]_2] + T[[11w]_2] + T[[100w]_2] + T[[1001w]_2], \tag{2.11}$$

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

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

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

$$0 = T[[w]_2] + T[[1w]_2] + T[[10w]_2] + T[[111w]_2], \tag{2.14}$$

$$0 = T[[1w]_2] + T[[10w]_2] + T[[11w]_2] + T[[1000w]_2], \tag{2.15}$$

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

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

First we calculate an 2-automaton that generates T from its minimal polynomial and its first terms. This automaton has 2013 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

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

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

$$0 = \tau(A(s, \epsilon)) + \tau(A(s, 1)) + \tau(A(s, 10)) + \tau(A(s, 111)), \tag{2.19}$$

$$0 = \tau(A(s, 1)) + \tau(A(s, 10)) + \tau(A(s, 11)) + \tau(A(s, 1000)), \tag{2.20}$$

$$0 = \tau(A(s, 10)) + \tau(A(s, 11)) + \tau(A(s, 100)) + \tau(A(s, 1001)), \tag{2.21}$$

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

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

$$0 = \tau(A(s,\epsilon)) + \tau(A(s,1)) + \tau(A(s,110)), \tag{2.23}$$
$$0 = \tau(A(s,\epsilon)) + \tau(A(s,1)) + \tau(A(s,10)) + \tau(A(s,111)), \tag{2.24}$$
$$0 = \tau(A(s,1)) + \tau(A(s,10)) + \tau(A(s,11)) + \tau(A(s,1000)), \tag{2.25}$$
$$0 = \tau(A(s,10)) + \tau(A(s,11)) + \tau(A(s,100)) + \tau(A(s,1001)), \tag{2.26}$$

for $s = A(i, 0^{2k})$. We find that $(A(i, 0^{42}), E_{42}) = (A(i, 0^{14}), E_{14})$, so that we only have to verify that identities (2.17) through (2.26) hold for $2 \le k \le 21$, which turns out to be true. □

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

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

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

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

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

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

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

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

$$W^e[:10v] M^e[:10v].$$

For all $n \le 10$, 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

$$\begin{aligned}
q_0(x) &= x^{20}+x^{19}+x^{18}+x^{17}+x^{16}+x^{15}+x^{14}+x^{12}+x^{11}+x^5,\\
q_1(x) &= x^{19}+x^{18}+x^{17}+x^{16}+x^{15}+x^{13}+x^{12}+x^{10}+x^6+x^4+x^2+x,\\
q_2(x) &= x^{20}+x^{18}+x^{14}+x^{12}+x^{10}+x^8+x^6+x^4+x^2+1,\\
q_3(x) &= x^{19}+x^{18}+x^{17}+x^{16}+x^{15}+x^{13}+x^{12}+x^{10}+x^6+x^4+x^2+x,\\
q_4(x) &= x^{20}+x^{19}+x^{17}+x^{16}+x^{15}+x^{11}+x^{10}+x^8+x^6+x^5+x^2.
\end{aligned}$$

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 $\mathrm{CF}(a,b) = f(1/z)$. $\square$

3. Annexe

All 16 polynomials are of the form

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

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

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

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

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

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

$$\begin{aligned}
p_0(x) &= x^{105} + x^{104} + x^{100} + x^{94} + x^{91} + x^{90} + x^{88} + x^{87} + x^{84} + x^{81} + x^{79} \\
&\quad + x^{78} + x^{77} + x^{75} + x^{71} + x^{65} + x^{63} + x^{62} + x^{61} + x^{59} + x^{57} + x^{55} \\
&\quad + x^{53} + x^{52} + x^{51} + x^{50} + x^{49} + x^{48} + x^{45} + x^{44} + x^{43} + x^{42} + x^{41} \\
&\quad + x^{40} + x^{39} + x^{35} + x^{34} + x^{33} + x^{24} + x^{23} + x^{21}, \\
p_3(x) &= x^{96} + x^{93} + x^{92} + x^{91} + x^{90} + x^{87} + x^{85} + x^{83} + x^{81} + x^{80} + x^{79} \\
&\quad + x^{76} + x^{73} + x^{72} + x^{71} + x^{68} + x^{66} + x^{65} + x^{64} + x^{61} + x^{60} + x^{59} \\
&\quad + x^{56} + x^{53} + x^{52} + x^{51} + x^{48} + x^{45} + x^{44} + x^{43} + x^{34} + x^{32} + x^{31} \\
&\quad + x^{28} + x^{25} + x^{23} + x^{21} + x^{19} + x^{17} + x^{15} + x^{13} + x^{11} + x^{10} + x^{9}, \\
p_6(x) &= x^{99} + x^{98} + x^{97} + x^{95} + x^{94} + x^{93} + x^{92} + x^{89} + x^{87} + x^{85} + x^{84} \\
&\quad + x^{80} + x^{77} + x^{76} + x^{75} + x^{73} + x^{72} + x^{68} + x^{67} + x^{66} + x^{65} + x^{61} \\
&\quad + x^{59} + x^{55} + x^{53} + x^{51} + x^{50} + x^{49} + x^{48} + x^{47} + x^{46} + x^{43} + x^{41} \\
&\quad + x^{37} + x^{35} + x^{33} + x^{32} + x^{31} + x^{30} + x^{26} + x^{21} + x^{20} + x^{19} + x^{15} \\
&\quad + x^{13} + x^{11} + x^{10} + x^{6}, \\
p_9(x) &= x^{102} + x^{100} + x^{99} + x^{96} + x^{94} + x^{93} + x^{90} + x^{87} + x^{86} + x^{85} + x^{84} \\
&\quad + x^{82} + x^{81} + x^{74} + x^{72} + x^{71} + x^{66} + x^{63} + x^{62} + x^{61} + x^{58} + x^{56} \\
&\quad + x^{55} + x^{54} + x^{52} + x^{51} + x^{50} + x^{47} + x^{45} + x^{43} + x^{41} + x^{40} + x^{39} \\
&\quad + x^{38} + x^{36} + x^{35} + x^{26} + x^{24} + x^{23} + x^{20} + x^{18} + x^{17} + x^{12} + x^{10} \\
&\quad + x^{9} + x^{6} + x^{4} + x^{3}, \\
p_{12}(x) &= x^{105} + x^{104} + x^{102} + x^{101} + x^{98} + x^{96} + x^{93} + x^{92} + x^{90} + x^{88} + x^{85} \\
&\quad + x^{84} + x^{82} + x^{80} + x^{41} + x^{40} + x^{38} + x^{37} + x^{34} + x^{32} + x^{29} + x^{28} \\
&\quad + x^{26} + x^{25} + x^{22} + x^{20} + x^{13} + x^{12} + x^{10} + x^{8} + x^{5} + x^{4} + x^{2} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{105} + x^{104} + x^{100} + x^{94} + x^{91} + x^{90} + x^{88} + x^{87} + x^{84} + x^{81} + x^{79} \\
&\quad + x^{78} + x^{77} + x^{75} + x^{71} + x^{65} + x^{63} + x^{62} + x^{61} + x^{59} + x^{57} + x^{55} \\
&\quad + x^{53} + x^{52} + x^{51} + x^{50} + x^{49} + x^{48} + x^{45} + x^{44} + x^{43} + x^{42} + x^{41} \\
&\quad + x^{40} + x^{39} + x^{35} + x^{34} + x^{33} + x^{24} + x^{23} + x^{21}, \\
p_3(x) &= x^{96} + x^{93} + x^{92} + x^{91} + x^{90} + x^{87} + x^{85} + x^{83} + x^{81} + x^{80} + x^{79} \\
&\quad + x^{76} + x^{73} + x^{72} + x^{71} + x^{68} + x^{66} + x^{65} + x^{64} + x^{61} + x^{60} + x^{59} \\
&\quad + x^{56} + x^{53} + x^{52} + x^{51} + x^{48} + x^{45} + x^{44} + x^{43} + x^{34} + x^{32} + x^{31} \\
&\quad + x^{28} + x^{25} + x^{23} + x^{21} + x^{19} + x^{17} + x^{15} + x^{13} + x^{11} + x^{10} + x^{9}, \\
p_6(x) &= x^{99} + x^{98} + x^{97} + x^{95} + x^{94} + x^{93} + x^{92} + x^{89} + x^{87} + x^{85} + x^{84} \\
&\quad + x^{80} + x^{77} + x^{76} + x^{75} + x^{73} + x^{72} + x^{68} + x^{67} + x^{66} + x^{65} + x^{61} \\
&\quad + x^{59} + x^{55} + x^{53} + x^{51} + x^{50} + x^{49} + x^{48} + x^{47} + x^{46} + x^{43} + x^{41} \\
&\quad + x^{37} + x^{35} + x^{33} + x^{32} + x^{31} + x^{30} + x^{26} + x^{21} + x^{20} + x^{19} + x^{15} \\
&\quad + x^{13} + x^{11} + x^{10} + x^{6}, \\
p_9(x) &= x^{102} + x^{100} + x^{99} + x^{96} + x^{94} + x^{93} + x^{90} + x^{87} + x^{86} + x^{85} + x^{84} \\
&\quad + x^{82} + x^{81} + x^{74} + x^{72} + x^{71} + x^{66} + x^{63} + x^{62} + x^{61} + x^{58} + x^{56} \\
&\quad + x^{55} + x^{54} + x^{52} + x^{51} + x^{50} + x^{47} + x^{45} + x^{43} + x^{41} + x^{40} + x^{39} \\
&\quad + x^{38} + x^{36} + x^{35} + x^{26} + x^{24} + x^{23} + x^{20} + x^{18} + x^{17} + x^{12} + x^{10} \\
&\quad + x^{9} + x^{6} + x^{4} + x^{3}, \\
p_{12}(x) &= x^{105} + x^{104} + x^{102} + x^{101} + x^{98} + x^{96} + x^{93} + x^{92} + x^{90} + x^{88} + x^{85} \\
&\quad + x^{84} + x^{82} + x^{80} + x^{41} + x^{40} + x^{38} + x^{37} + x^{34} + x^{32} + x^{29} + x^{28} \\
&\quad + x^{26} + x^{25} + x^{22} + x^{20} + x^{13} + x^{12} + x^{10} + x^{8} + x^{5} + x^{4} + x^{2} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{114} + x^{110} + x^{100} + x^{96} + x^{94} + x^{90} + x^{86} + x^{82} + x^{78} + x^{72} + x^{70} \\
&\quad + x^{64} + x^{60} + x^{56} + x^{54} + x^{50} + x^{42} + x^{40} + x^{38} + x^{32} + x^{30}, \\
p_3(x) &= x^{112} + x^{110} + x^{108} + x^{106} + x^{94} + x^{92} + x^{88} + x^{82} + x^{80} + x^{76} + x^{68} \\
&\quad + x^{64} + x^{60} + x^{54} + x^{52} + x^{50} + x^{40} + x^{26} + x^{22} + x^{14} + x^{8} + x^{6}, \\
p_6(x) &= x^{112} + x^{110} + x^{104} + x^{102} + x^{100} + x^{96} + x^{94} + x^{90} + x^{88} + x^{82} + x^{80} \\
&\quad + x^{78} + x^{68} + x^{62} + x^{60} + x^{58} + x^{54} + x^{52} + x^{50} + x^{46} + x^{42} + x^{40} \\
&\quad + x^{30} + x^{22} + x^{20} + x^{18} + x^{16} + x^{14} + x^{12} + x^{10} + x^{6} + 1, \\
p_9(x) &= x^{112} + x^{110} + x^{108} + x^{98} + x^{90} + x^{86} + x^{84} + x^{82} + x^{80} + x^{76} + x^{72} \\
&\quad + x^{70} + x^{68} + x^{66} + x^{64} + x^{54} + x^{48} + x^{38} + x^{32} + x^{24} + x^{20} + x^{16} \\
&\quad + x^{10} + x^{8} + x^{4} + x^{2},
\end{aligned}$$

$$\begin{aligned}p_{12}(x) &= x^{114}+x^{112}+x^{90}+x^{88}+x^{82}+x^{80}+x^{50}+x^{48}+x^{34}+x^{32}+x^{26}\\ &\quad +x^{24}+x^{18}+x^{16}+x^{10}+x^{8}+x^{2}+1,\end{aligned}$$

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

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

$$\begin{aligned}p_0(x) &= x^{114}+x^{108}+x^{106}+x^{102}+x^{98}+x^{94}+x^{92}+x^{90}+x^{86}+x^{84}+x^{82}\\ &\quad +x^{78}+x^{74}+x^{72}+x^{70}+x^{68}+x^{66}+x^{64}+x^{60}+x^{58}+x^{52}+x^{50}\\ &\quad +x^{42}+x^{38}+x^{32}+x^{30}+x^{28}+x^{26}+x^{24}+x^{22}+x^{16}+x^{14}+x^{12},\\ p_3(x) &= x^{112}+x^{110}+x^{106}+x^{100}+x^{98}+x^{94}+x^{92}+x^{86}+x^{80}+x^{78}+x^{74}\\ &\quad +x^{62}+x^{60}+x^{50}+x^{48}+x^{46}+x^{40}+x^{38}+x^{36}+x^{32}+x^{30}+x^{26}\\ &\quad +x^{16}+x^{12}+x^{10}+x^{8},\\ p_6(x) &= x^{112}+x^{106}+x^{100}+x^{92}+x^{90}+x^{86}+x^{80}+x^{76}+x^{72}+x^{66}+x^{60}\\ &\quad +x^{58}+x^{54}+x^{52}+x^{42}+x^{40}+x^{34}+x^{20}+x^{18}+x^{14}+x^{12}+x^{10}\\ &\quad +x^{8}+x^{6}+x^{4}+1,\\ p_9(x) &= x^{112}+x^{110}+x^{108}+x^{98}+x^{90}+x^{86}+x^{84}+x^{82}+x^{80}+x^{76}+x^{72}\\ &\quad +x^{70}+x^{68}+x^{66}+x^{64}+x^{54}+x^{48}+x^{38}+x^{32}+x^{24}+x^{20}+x^{16}\\ &\quad +x^{10}+x^{8}+x^{4}+x^{2},\\ p_{12}(x) &= x^{114}+x^{112}+x^{90}+x^{88}+x^{82}+x^{80}+x^{50}+x^{48}+x^{34}+x^{32}+x^{26}\\ &\quad +x^{24}+x^{18}+x^{16}+x^{10}+x^{8}+x^{2}+1,\end{aligned}$$

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

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

$$\begin{aligned}p_0(x) &= x^{105}+x^{104}+x^{100}+x^{99}+x^{98}+x^{97}+x^{94}+x^{92}+x^{90}+x^{89}+x^{88}\\ &\quad +x^{87}+x^{86}+x^{84}+x^{83}+x^{82}+x^{81}+x^{80}+x^{78}+x^{77}+x^{75}+x^{72}\\ &\quad +x^{71}+x^{70}+x^{69}+x^{68}+x^{67}+x^{66}+x^{65}+x^{64}+x^{63}+x^{62}+x^{59}\\ &\quad +x^{58}+x^{57}+x^{55}+x^{54}+x^{53}+x^{51}+x^{44}+x^{41}+x^{39}+x^{38}+x^{37}\\ &\quad +x^{36}+x^{32}+x^{24}+x^{23}+x^{20}+x^{19}+x^{18},\\ p_3(x) &= x^{96}+x^{93}+x^{92}+x^{91}+x^{90}+x^{87}+x^{85}+x^{83}+x^{81}+x^{80}+x^{79}\\ &\quad +x^{76}+x^{73}+x^{72}+x^{71}+x^{68}+x^{66}+x^{65}+x^{64}+x^{61}+x^{60}+x^{59}\\ &\quad +x^{56}+x^{53}+x^{52}+x^{51}+x^{48}+x^{45}+x^{44}+x^{43}+x^{34}+x^{32}+x^{31}\\ &\quad +x^{28}+x^{25}+x^{23}+x^{21}+x^{19}+x^{17}+x^{15}+x^{13}+x^{11}+x^{10}+x^{9},\\ p_6(x) &= x^{99}+x^{98}+x^{97}+x^{95}+x^{94}+x^{93}+x^{92}+x^{89}+x^{87}+x^{85}+x^{84}\\ &\quad +x^{80}+x^{77}+x^{76}+x^{75}+x^{73}+x^{72}+x^{68}+x^{67}+x^{66}+x^{65}+x^{61}\\ &\quad +x^{59}+x^{55}+x^{53}+x^{51}+x^{50}+x^{49}+x^{48}+x^{47}+x^{46}+x^{43}+x^{41}\\ &\quad +x^{37}+x^{35}+x^{33}+x^{32}+x^{31}+x^{30}+x^{26}+x^{21}+x^{20}+x^{19}+x^{15}\\ &\quad +x^{13}+x^{11}+x^{10}+x^{6},\\ p_9(x) &= x^{102}+x^{100}+x^{99}+x^{96}+x^{94}+x^{93}+x^{90}+x^{87}+x^{86}+x^{85}+x^{84}\end{aligned}$$

$$+ x^{82} + x^{81} + x^{74} + x^{72} + x^{71} + x^{66} + x^{63} + x^{62} + x^{61} + x^{58} + x^{56} + x^{55} + x^{54} + x^{52} + x^{51} + x^{50} + x^{47} + x^{45} + x^{43} + x^{41} + x^{40} + x^{39} + x^{38} + x^{36} + x^{35} + x^{26} + x^{24} + x^{23} + x^{20} + x^{18} + x^{17} + x^{12} + x^{10} + x^{9} + x^{6} + x^{4} + x^{3},$$

$$p_{12}(x) = x^{105} + x^{104} + x^{102} + x^{101} + x^{98} + x^{96} + x^{93} + x^{92} + x^{90} + x^{88} + x^{85} + x^{84} + x^{82} + x^{80} + x^{41} + x^{40} + x^{38} + x^{37} + x^{34} + x^{32} + x^{29} + x^{28} + x^{26} + x^{25} + x^{22} + x^{20} + x^{13} + x^{12} + x^{10} + x^{8} + x^{5} + x^{4} + x^{2} + 1,$$

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

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

$$p_0(x) = x^{105} + x^{104} + x^{100} + x^{99} + x^{98} + x^{97} + x^{94} + x^{92} + x^{90} + x^{89} + x^{88} + x^{87} + x^{86} + x^{84} + x^{83} + x^{82} + x^{81} + x^{80} + x^{78} + x^{77} + x^{75} + x^{72} + x^{71} + x^{70} + x^{69} + x^{68} + x^{67} + x^{66} + x^{65} + x^{64} + x^{63} + x^{62} + x^{59} + x^{58} + x^{57} + x^{55} + x^{54} + x^{53} + x^{51} + x^{44} + x^{41} + x^{39} + x^{38} + x^{37} + x^{36} + x^{32} + x^{24} + x^{23} + x^{20} + x^{19} + x^{18},$$

$$p_3(x) = x^{96} + x^{93} + x^{92} + x^{91} + x^{90} + x^{87} + x^{85} + x^{83} + x^{81} + x^{80} + x^{79} + x^{76} + x^{73} + x^{72} + x^{71} + x^{68} + x^{66} + x^{65} + x^{64} + x^{61} + x^{60} + x^{59} + x^{56} + x^{53} + x^{52} + x^{51} + x^{48} + x^{45} + x^{44} + x^{43} + x^{34} + x^{32} + x^{31} + x^{28} + x^{25} + x^{23} + x^{21} + x^{19} + x^{17} + x^{15} + x^{13} + x^{11} + x^{10} + x^{9},$$

$$p_6(x) = x^{99} + x^{98} + x^{97} + x^{95} + x^{94} + x^{93} + x^{92} + x^{89} + x^{87} + x^{85} + x^{84} + x^{80} + x^{77} + x^{76} + x^{75} + x^{73} + x^{72} + x^{68} + x^{67} + x^{66} + x^{65} + x^{61} + x^{59} + x^{55} + x^{53} + x^{51} + x^{50} + x^{49} + x^{48} + x^{47} + x^{46} + x^{43} + x^{41} + x^{37} + x^{35} + x^{33} + x^{32} + x^{31} + x^{30} + x^{26} + x^{21} + x^{20} + x^{19} + x^{15} + x^{13} + x^{11} + x^{10} + x^{6},$$

$$p_9(x) = x^{102} + x^{100} + x^{99} + x^{96} + x^{94} + x^{93} + x^{90} + x^{87} + x^{86} + x^{85} + x^{84} + x^{82} + x^{81} + x^{74} + x^{72} + x^{71} + x^{66} + x^{63} + x^{62} + x^{61} + x^{58} + x^{56} + x^{55} + x^{54} + x^{52} + x^{51} + x^{50} + x^{47} + x^{45} + x^{43} + x^{41} + x^{40} + x^{39} + x^{38} + x^{36} + x^{35} + x^{26} + x^{24} + x^{23} + x^{20} + x^{18} + x^{17} + x^{12} + x^{10} + x^{9} + x^{6} + x^{4} + x^{3},$$

$$p_{12}(x) = x^{105} + x^{104} + x^{102} + x^{101} + x^{98} + x^{96} + x^{93} + x^{92} + x^{90} + x^{88} + x^{85} + x^{84} + x^{82} + x^{80} + x^{41} + x^{40} + x^{38} + x^{37} + x^{34} + x^{32} + x^{29} + x^{28} + x^{26} + x^{25} + x^{22} + x^{20} + x^{13} + x^{12} + x^{10} + x^{8} + x^{5} + x^{4} + x^{2} + 1,$$

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

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

$$p_0(x) = x^{96} + x^{94} + x^{90} + x^{84} + x^{82} + x^{78} + x^{76} + x^{74} + x^{68} + x^{66} + x^{64} + x^{52} + x^{48} + x^{46} + x^{44} + x^{38} + x^{24},$$

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

and the initial terms are [0, 0, 1, 0, 1, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0].
For $\phi(M^o, 0, 0)$:

$$\begin{aligned}
p_0(x) &= x^{105} + x^{104} + x^{103} + x^{101} + x^{97} + x^{94} + x^{92} + x^{88} + x^{87} + x^{81} + x^{80} \\
&\quad + x^{78} + x^{76} + x^{72} + x^{71} + x^{69} + x^{66} + x^{65} + x^{64} + x^{63} + x^{62} + x^{60} \\
&\quad + x^{58} + x^{55} + x^{54} + x^{53} + x^{51} + x^{46} + x^{45} + x^{40} + x^{39} + x^{26} + x^{24} \\
&\quad + x^{23} + x^{22} + x^{16} + x^{12}, \\
p_3(x) &= x^{101} + x^{100} + x^{99} + x^{97} + x^{92} + x^{91} + x^{90} + x^{89} + x^{87} + x^{84} + x^{83} \\
&\quad + x^{82} + x^{81} + x^{78} + x^{73} + x^{72} + x^{66} + x^{59} + x^{57} + x^{56} + x^{55} + x^{54} \\
&\quad + x^{48} + x^{47} + x^{46} + x^{44} + x^{43} + x^{42} + x^{40} + x^{38} + x^{37} + x^{36} + x^{35} \\
&\quad + x^{34} + x^{32} + x^{28} + x^{24} + x^{22} + x^{21} + x^{19} + x^{18} + x^{17} + x^{14} + x^{8}, \\
p_6(x) &= x^{103} + x^{102} + x^{98} + x^{97} + x^{96} + x^{94} + x^{90} + x^{89} + x^{88} + x^{84} + x^{83} \\
&\quad + x^{82} + x^{81} + x^{80} + x^{79} + x^{78} + x^{75} + x^{74} + x^{73} + x^{72} + x^{70} + x^{68} \\
&\quad + x^{67} + x^{64} + x^{62} + x^{61} + x^{57} + x^{56} + x^{55} + x^{53} + x^{51} + x^{50} + x^{47} \\
&\quad + x^{46} + x^{45} + x^{44} + x^{42} + x^{40} + x^{38} + x^{36} + x^{32} + x^{30} + x^{29} + x^{28} \\
&\quad + x^{27} + x^{26} + x^{24} + x^{20} + x^{18} + x^{17} + x^{16} + x^{15} + x^{14} + x^{12} + x^{8} \\
&\quad + x^{5} + x^{2} + 1, \\
p_9(x) &= x^{101} + x^{100} + x^{98} + x^{96} + x^{93} + x^{92} + x^{90} + x^{89} + x^{86} + x^{84} + x^{37} \\
&\quad + x^{36} + x^{34} + x^{32} + x^{29} + x^{28} + x^{26} + x^{25} + x^{22} + x^{21} + x^{18} + x^{16} \\
&\quad + x^{13} + x^{12} + x^{10} + x^{9} + x^{6} + x^{4}, \\
p_{12}(x) &= x^{105} + x^{104} + x^{102} + x^{100} + x^{89} + x^{88} + x^{86} + x^{85} + x^{82} + x^{80} + x^{41} \\
&\quad + x^{40} + x^{38} + x^{36} + x^{21} + x^{20} + x^{18} + x^{16} + x^{9} + x^{8} + x^{6} + x^{5} + x^{2} \\
&\quad + 1,
\end{aligned}$$

and the initial terms are [1, 0, 1, 0, 1, 1, 1, 0, 1, 0, 1, 1, 0, 0, 0, 1].
For $\phi(M^o, 0, 1)$:

$$\begin{aligned}
p_0(x) &= x^{116} + x^{113} + x^{110} + x^{105} + x^{100} + x^{97} + x^{95} + x^{93} + x^{89} + x^{84} + x^{83} \\
&\quad + x^{77} + x^{73} + x^{70} + x^{68} + x^{66} + x^{60} + x^{57} + x^{55} + x^{54} + x^{53} + x^{50} \\
&\quad + x^{48} + x^{47} + x^{45} + x^{41} + x^{39} + x^{38} + x^{35} + x^{34} + x^{30} + x^{28} + x^{25} \\
&\quad + x^{24} + x^{23} + x^{21},
\end{aligned}$$

$$\begin{aligned}
p_3(x) = {} & x^{107} + x^{106} + x^{102} + x^{101} + x^{99} + x^{97} + x^{96} + x^{95} + x^{94} + x^{91} + x^{87} \\
& + x^{85} + x^{84} + x^{83} + x^{82} + x^{78} + x^{75} + x^{74} + x^{72} + x^{70} + x^{69} + x^{68} \\
& + x^{67} + x^{63} + x^{60} + x^{58} + x^{57} + x^{55} + x^{52} + x^{51} + x^{49} + x^{47} + x^{46} \\
& + x^{45} + x^{44} + x^{43} + x^{42} + x^{40} + x^{38} + x^{36} + x^{35} + x^{34} + x^{33} + x^{29} \\
& + x^{27} + x^{25} + x^{23} + x^{22} + x^{20} + x^{19} + x^{17} + x^{16} + x^{15} + x^{14} + x^{13} \\
& + x^{11} + x^{10} + x^{9}, \\
p_6(x) = {} & x^{110} + x^{108} + x^{106} + x^{104} + x^{100} + x^{90} + x^{88} + x^{84} + x^{82} + x^{80} + x^{78} \\
& + x^{74} + x^{72} + x^{68} + x^{60} + x^{56} + x^{54} + x^{48} + x^{46} + x^{42} + x^{40} + x^{38} \\
& + x^{34} + x^{32} + x^{30} + x^{28} + x^{24} + x^{22} + x^{20} + x^{18} + x^{16} + x^{12} + x^{8} \\
& + x^{6}, \\
p_9(x) = {} & x^{113} + x^{112} + x^{111} + x^{110} + x^{108} + x^{107} + x^{106} + x^{105} + x^{104} + x^{102} \\
& + x^{101} + x^{98} + x^{97} + x^{93} + x^{91} + x^{89} + x^{87} + x^{86} + x^{84} + x^{83} + x^{49} \\
& + x^{48} + x^{47} + x^{46} + x^{44} + x^{43} + x^{42} + x^{41} + x^{40} + x^{38} + x^{37} + x^{34} \\
& + x^{32} + x^{31} + x^{30} + x^{29} + x^{28} + x^{26} + x^{24} + x^{23} + x^{21} + x^{20} + x^{19} \\
& + x^{18} + x^{17} + x^{13} + x^{11} + x^{9} + x^{7} + x^{6} + x^{4} + x^{3}, \\
p_{12}(x) = {} & x^{116} + x^{104} + x^{96} + x^{88} + x^{80} + x^{52} + x^{40} + x^{36} + x^{32} + x^{8} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) = {} & x^{104} + x^{101} + x^{100} + x^{97} + x^{93} + x^{90} + x^{89} + x^{84} + x^{81} + x^{77} + x^{76} \\
& + x^{75} + x^{74} + x^{72} + x^{70} + x^{68} + x^{64} + x^{62} + x^{59} + x^{58} + x^{56} + x^{55} \\
& + x^{54} + x^{53} + x^{52} + x^{51} + x^{50} + x^{44} + x^{43} + x^{42} + x^{39} + x^{37} + x^{36} \\
& + x^{35} + x^{34} + x^{33} + x^{32} + x^{29} + x^{28} + x^{26} + x^{25} + x^{23} + x^{20} + x^{19} \\
& + x^{18}, \\
p_3(x) = {} & x^{95} + x^{94} + x^{91} + x^{89} + x^{87} + x^{86} + x^{84} + x^{83} + x^{81} + x^{80} + x^{77} \\
& + x^{74} + x^{68} + x^{64} + x^{63} + x^{62} + x^{61} + x^{60} + x^{59} + x^{58} + x^{57} + x^{56} \\
& + x^{55} + x^{54} + x^{53} + x^{52} + x^{51} + x^{50} + x^{49} + x^{48} + x^{47} + x^{46} + x^{45} \\
& + x^{44} + x^{43} + x^{42} + x^{41} + x^{40} + x^{37} + x^{36} + x^{34} + x^{32} + x^{29} + x^{26} \\
& + x^{23} + x^{22} + x^{20} + x^{19} + x^{17} + x^{16} + x^{15} + x^{14} + x^{13} + x^{11} + x^{10} \\
& + x^{9}, \\
p_6(x) = {} & x^{98} + x^{96} + x^{90} + x^{86} + x^{82} + x^{80} + x^{76} + x^{74} + x^{70} + x^{68} + x^{66} \\
& + x^{64} + x^{62} + x^{58} + x^{56} + x^{52} + x^{44} + x^{40} + x^{38} + x^{34} + x^{28} + x^{26} \\
& + x^{20} + x^{18} + x^{16} + x^{12} + x^{8} + x^{6}, \\
p_9(x) = {} & x^{101} + x^{100} + x^{99} + x^{98} + x^{97} + x^{93} + x^{91} + x^{89} + x^{87} + x^{86} + x^{84} \\
& + x^{83} + x^{37} + x^{36} + x^{35} + x^{34} + x^{33} + x^{29} + x^{27} + x^{25} + x^{23} + x^{22} \\
& + x^{21} + x^{18} + x^{17} + x^{13} + x^{11} + x^{9} + x^{7} + x^{6} + x^{4} + x^{3},
\end{aligned}$$

$$p_{12}(x) = x^{104} + x^{100} + x^{88} + x^{80} + x^{40} + x^{36} + x^{20} + x^{16} + x^{8} + 1,$$

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

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

$$\begin{aligned}
p_0(x) = {} & x^{105} + x^{104} + x^{103} + x^{100} + x^{99} + x^{96} + x^{94} + x^{93} + x^{91} + x^{88} + x^{87} \\
& + x^{86} + x^{85} + x^{81} + x^{73} + x^{72} + x^{68} + x^{67} + x^{65} + x^{63} + x^{61} + x^{59} \\
& + x^{58} + x^{57} + x^{55} + x^{52} + x^{50} + x^{49} + x^{47} + x^{43} + x^{40} + x^{38} + x^{35} \\
& + x^{34} + x^{33} + x^{32} + x^{31} + x^{28} + x^{27}, \\
p_3(x) = {} & x^{101} + x^{100} + x^{99} + x^{96} + x^{95} + x^{92} + x^{90} + x^{86} + x^{85} + x^{81} + x^{77} \\
& + x^{76} + x^{75} + x^{73} + x^{72} + x^{70} + x^{69} + x^{68} + x^{65} + x^{63} + x^{59} + x^{58} \\
& + x^{54} + x^{50} + x^{49} + x^{46} + x^{44} + x^{43} + x^{40} + x^{38} + x^{37} + x^{36} + x^{30} \\
& + x^{29} + x^{27} + x^{25} + x^{23} + x^{20} + x^{16} + x^{15} + x^{13} + x^{12}, \\
p_6(x) = {} & x^{103} + x^{102} + x^{101} + x^{100} + x^{99} + x^{98} + x^{97} + x^{96} + x^{95} + x^{94} + x^{92} \\
& + x^{89} + x^{88} + x^{87} + x^{86} + x^{85} + x^{84} + x^{83} + x^{82} + x^{81} + x^{79} + x^{78} \\
& + x^{73} + x^{68} + x^{66} + x^{65} + x^{64} + x^{62} + x^{61} + x^{60} + x^{59} + x^{58} + x^{57} \\
& + x^{53} + x^{52} + x^{50} + x^{49} + x^{43} + x^{40} + x^{37} + x^{35} + x^{33} + x^{31} + x^{29} \\
& + x^{28} + x^{27} + x^{25} + x^{22} + x^{19} + x^{16} + x^{13} + x^{11} + x^{10} + x^{9} + x^{5} + x^{4} \\
& + x^{2} + 1, \\
p_9(x) = {} & x^{101} + x^{100} + x^{98} + x^{96} + x^{93} + x^{92} + x^{90} + x^{89} + x^{86} + x^{84} + x^{37} \\
& + x^{36} + x^{34} + x^{32} + x^{29} + x^{28} + x^{26} + x^{25} + x^{22} + x^{21} + x^{18} + x^{16} \\
& + x^{13} + x^{12} + x^{10} + x^{9} + x^{6} + x^{4}, \\
p_{12}(x) = {} & x^{105} + x^{104} + x^{102} + x^{100} + x^{89} + x^{88} + x^{86} + x^{85} + x^{82} + x^{80} + x^{41} \\
& + x^{40} + x^{38} + x^{36} + x^{21} + x^{20} + x^{18} + x^{16} + x^{9} + x^{8} + x^{6} + x^{5} + x^{2} \\
& + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) = {} & x^{105} + x^{104} + x^{103} + x^{101} + x^{97} + x^{94} + x^{92} + x^{88} + x^{87} + x^{81} + x^{80} \\
& + x^{78} + x^{76} + x^{72} + x^{71} + x^{69} + x^{66} + x^{65} + x^{64} + x^{63} + x^{62} + x^{60} \\
& + x^{58} + x^{55} + x^{54} + x^{53} + x^{51} + x^{46} + x^{45} + x^{40} + x^{39} + x^{26} + x^{24} \\
& + x^{23} + x^{22} + x^{16} + x^{12}, \\
p_3(x) = {} & x^{101} + x^{100} + x^{99} + x^{97} + x^{92} + x^{91} + x^{90} + x^{89} + x^{87} + x^{84} + x^{83} \\
& + x^{82} + x^{81} + x^{78} + x^{73} + x^{72} + x^{66} + x^{59} + x^{57} + x^{56} + x^{55} + x^{54} \\
& + x^{48} + x^{47} + x^{46} + x^{44} + x^{43} + x^{42} + x^{40} + x^{38} + x^{37} + x^{36} + x^{35} \\
& + x^{34} + x^{32} + x^{28} + x^{24} + x^{22} + x^{21} + x^{19} + x^{18} + x^{17} + x^{14} + x^{8}, \\
p_6(x) = {} & x^{103} + x^{102} + x^{98} + x^{97} + x^{96} + x^{94} + x^{90} + x^{89} + x^{88} + x^{84} + x^{83} \\
& + x^{82} + x^{81} + x^{80} + x^{79} + x^{78} + x^{75} + x^{74} + x^{73} + x^{72} + x^{70} + x^{68}
\end{aligned}$$

$$
\begin{aligned}
&+ x^{67} + x^{64} + x^{62} + x^{61} + x^{57} + x^{56} + x^{55} + x^{53} + x^{51} + x^{50} + x^{47}\\
&+ x^{46} + x^{45} + x^{44} + x^{42} + x^{40} + x^{38} + x^{36} + x^{32} + x^{30} + x^{29} + x^{28}\\
&+ x^{27} + x^{26} + x^{24} + x^{20} + x^{18} + x^{17} + x^{16} + x^{15} + x^{14} + x^{12} + x^{8}\\
&+ x^{5} + x^{2} + 1,\\
p_9(x) = &x^{101} + x^{100} + x^{98} + x^{96} + x^{93} + x^{92} + x^{90} + x^{89} + x^{86} + x^{84} + x^{37}\\
&+ x^{36} + x^{34} + x^{32} + x^{29} + x^{28} + x^{26} + x^{25} + x^{22} + x^{21} + x^{18} + x^{16}\\
&+ x^{13} + x^{12} + x^{10} + x^{9} + x^{6} + x^{4},\\
p_{12}(x) = &x^{105} + x^{104} + x^{102} + x^{100} + x^{89} + x^{88} + x^{86} + x^{85} + x^{82} + x^{80} + x^{41}\\
&+ x^{40} + x^{38} + x^{36} + x^{21} + x^{20} + x^{18} + x^{16} + x^{9} + x^{8} + x^{6} + x^{5} + x^{2}\\
&+ 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) = &x^{104} + x^{101} + x^{100} + x^{97} + x^{93} + x^{90} + x^{89} + x^{84} + x^{81} + x^{77} + x^{76}\\
&+ x^{75} + x^{74} + x^{72} + x^{70} + x^{68} + x^{64} + x^{62} + x^{59} + x^{58} + x^{56} + x^{55}\\
&+ x^{54} + x^{53} + x^{52} + x^{51} + x^{50} + x^{44} + x^{43} + x^{42} + x^{39} + x^{37} + x^{36}\\
&+ x^{35} + x^{34} + x^{33} + x^{32} + x^{29} + x^{28} + x^{26} + x^{25} + x^{23} + x^{20} + x^{19}\\
&+ x^{18},\\
p_3(x) = &x^{95} + x^{94} + x^{91} + x^{89} + x^{87} + x^{86} + x^{84} + x^{83} + x^{81} + x^{80} + x^{77}\\
&+ x^{74} + x^{68} + x^{64} + x^{63} + x^{62} + x^{61} + x^{60} + x^{59} + x^{58} + x^{57} + x^{56}\\
&+ x^{55} + x^{54} + x^{53} + x^{52} + x^{51} + x^{50} + x^{49} + x^{48} + x^{47} + x^{46} + x^{45}\\
&+ x^{44} + x^{43} + x^{42} + x^{41} + x^{40} + x^{37} + x^{36} + x^{34} + x^{32} + x^{29} + x^{26}\\
&+ x^{23} + x^{22} + x^{20} + x^{19} + x^{17} + x^{16} + x^{15} + x^{14} + x^{13} + x^{11} + x^{10}\\
&+ x^{9},\\
p_6(x) = &x^{98} + x^{96} + x^{90} + x^{86} + x^{82} + x^{80} + x^{76} + x^{74} + x^{70} + x^{68} + x^{66}\\
&+ x^{64} + x^{62} + x^{58} + x^{56} + x^{52} + x^{44} + x^{40} + x^{38} + x^{34} + x^{28} + x^{26}\\
&+ x^{20} + x^{18} + x^{16} + x^{12} + x^{8} + x^{6},\\
p_9(x) = &x^{101} + x^{100} + x^{99} + x^{98} + x^{97} + x^{93} + x^{91} + x^{89} + x^{87} + x^{86} + x^{84}\\
&+ x^{83} + x^{37} + x^{36} + x^{35} + x^{34} + x^{33} + x^{29} + x^{27} + x^{25} + x^{23} + x^{22}\\
&+ x^{21} + x^{18} + x^{17} + x^{13} + x^{11} + x^{9} + x^{7} + x^{6} + x^{4} + x^{3},\\
p_{12}(x) = &x^{104} + x^{100} + x^{88} + x^{80} + x^{40} + x^{36} + x^{20} + x^{16} + x^{8} + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) = &x^{116} + x^{113} + x^{110} + x^{105} + x^{100} + x^{97} + x^{95} + x^{93} + x^{89} + x^{84} + x^{83}\\
&+ x^{77} + x^{73} + x^{70} + x^{68} + x^{66} + x^{60} + x^{57} + x^{55} + x^{54} + x^{53} + x^{50}\\
&+ x^{48} + x^{47} + x^{45} + x^{41} + x^{39} + x^{38} + x^{35} + x^{34} + x^{30} + x^{28} + x^{25}
\end{aligned}
$$

$$
\begin{aligned}
&+ x^{24} + x^{23} + x^{21},\\
p_3(x) &= x^{107} + x^{106} + x^{102} + x^{101} + x^{99} + x^{97} + x^{96} + x^{95} + x^{94} + x^{91} + x^{87}\\
&+ x^{85} + x^{84} + x^{83} + x^{82} + x^{78} + x^{75} + x^{74} + x^{72} + x^{70} + x^{69} + x^{68}\\
&+ x^{67} + x^{63} + x^{60} + x^{58} + x^{57} + x^{55} + x^{52} + x^{51} + x^{49} + x^{47} + x^{46}\\
&+ x^{45} + x^{44} + x^{43} + x^{42} + x^{40} + x^{38} + x^{36} + x^{35} + x^{34} + x^{33} + x^{29}\\
&+ x^{27} + x^{25} + x^{23} + x^{22} + x^{20} + x^{19} + x^{17} + x^{16} + x^{15} + x^{14} + x^{13}\\
&+ x^{11} + x^{10} + x^{9},\\
p_6(x) &= x^{110} + x^{108} + x^{106} + x^{104} + x^{100} + x^{90} + x^{88} + x^{84} + x^{82} + x^{80} + x^{78}\\
&+ x^{74} + x^{72} + x^{68} + x^{60} + x^{56} + x^{54} + x^{48} + x^{46} + x^{42} + x^{40} + x^{38}\\
&+ x^{34} + x^{32} + x^{30} + x^{28} + x^{24} + x^{22} + x^{20} + x^{18} + x^{16} + x^{12} + x^{8}\\
&+ x^{6},\\
p_9(x) &= x^{113} + x^{112} + x^{111} + x^{110} + x^{108} + x^{107} + x^{106} + x^{105} + x^{104} + x^{102}\\
&+ x^{101} + x^{98} + x^{97} + x^{93} + x^{91} + x^{89} + x^{87} + x^{86} + x^{84} + x^{83} + x^{49}\\
&+ x^{48} + x^{47} + x^{46} + x^{44} + x^{43} + x^{42} + x^{41} + x^{40} + x^{38} + x^{37} + x^{34}\\
&+ x^{32} + x^{31} + x^{30} + x^{29} + x^{28} + x^{26} + x^{24} + x^{23} + x^{21} + x^{20} + x^{19}\\
&+ x^{18} + x^{17} + x^{13} + x^{11} + x^{9} + x^{7} + x^{6} + x^{4} + x^{3},\\
p_{12}(x) &= x^{116} + x^{104} + x^{96} + x^{88} + x^{80} + x^{52} + x^{40} + x^{36} + x^{32} + x^{8} + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{105} + x^{104} + x^{103} + x^{100} + x^{99} + x^{96} + x^{94} + x^{93} + x^{91} + x^{88} + x^{87}\\
&+ x^{86} + x^{85} + x^{81} + x^{73} + x^{72} + x^{68} + x^{67} + x^{65} + x^{63} + x^{61} + x^{59}\\
&+ x^{58} + x^{57} + x^{55} + x^{52} + x^{50} + x^{49} + x^{47} + x^{43} + x^{40} + x^{38} + x^{35}\\
&+ x^{34} + x^{33} + x^{32} + x^{31} + x^{28} + x^{27},\\
p_3(x) &= x^{101} + x^{100} + x^{99} + x^{96} + x^{95} + x^{92} + x^{90} + x^{86} + x^{85} + x^{81} + x^{77}\\
&+ x^{76} + x^{75} + x^{73} + x^{72} + x^{70} + x^{69} + x^{68} + x^{65} + x^{63} + x^{59} + x^{58}\\
&+ x^{54} + x^{50} + x^{49} + x^{46} + x^{44} + x^{43} + x^{40} + x^{38} + x^{37} + x^{36} + x^{30}\\
&+ x^{29} + x^{27} + x^{25} + x^{23} + x^{20} + x^{16} + x^{15} + x^{13} + x^{12},\\
p_6(x) &= x^{103} + x^{102} + x^{101} + x^{100} + x^{99} + x^{98} + x^{97} + x^{96} + x^{95} + x^{94} + x^{92}\\
&+ x^{89} + x^{88} + x^{87} + x^{86} + x^{85} + x^{84} + x^{83} + x^{82} + x^{81} + x^{79} + x^{78}\\
&+ x^{73} + x^{68} + x^{66} + x^{65} + x^{64} + x^{62} + x^{61} + x^{60} + x^{59} + x^{58} + x^{57}\\
&+ x^{53} + x^{52} + x^{50} + x^{49} + x^{43} + x^{40} + x^{37} + x^{35} + x^{33} + x^{31} + x^{29}\\
&+ x^{28} + x^{27} + x^{25} + x^{22} + x^{19} + x^{16} + x^{13} + x^{11} + x^{10} + x^{9} + x^{5} + x^{4}\\
&+ x^{2} + 1,\\
p_9(x) &= x^{101} + x^{100} + x^{98} + x^{96} + x^{93} + x^{92} + x^{90} + x^{89} + x^{86} + x^{84} + x^{37}\\
&+ x^{36} + x^{34} + x^{32} + x^{29} + x^{28} + x^{26} + x^{25} + x^{22} + x^{21} + x^{18} + x^{16}
\end{aligned}
$$

$$
\begin{aligned}
&+ x^{13} + x^{12} + x^{10} + x^9 + x^6 + x^4, \\
p_{12}(x) = {} & x^{105} + x^{104} + x^{102} + x^{100} + x^{89} + x^{88} + x^{86} + x^{85} + x^{82} + x^{80} + x^{41} \\
&+ x^{40} + x^{38} + x^{36} + x^{21} + x^{20} + x^{18} + x^{16} + x^9 + x^8 + x^6 + x^5 + x^2 \\
&+ 1,
\end{aligned}
$$

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

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]	504	[879, 880]	1008	[1505, 1506]	1512	[1691, 918]
1	[3, 4]	505	[881, 882]	1009	[1352, 1391]	1513	[1870, 948]
2	[5, 6]	506	[439, 883]	1010	[1507, 1508]	1514	[1846, 1871]
3	[7, 8]	507	[884, 885]	1011	[1509, 1510]	1515	[798, 1673]
4	[9, 10]	508	[886, 887]	1012	[1238, 1511]	1516	[800, 1872]
5	[11, 12]	509	[888, 69]	1013	[1240, 1512]	1517	[1873, 1874]
6	[13, 14]	510	[889, 890]	1014	[1513, 1345]	1518	[1786, 432]
7	[15, 16]	511	[891, 892]	1015	[704, 1275]	1519	[1875, 1708]
8	[17, 18]	512	[893, 894]	1016	[1250, 1514]	1520	[1876, 940]
9	[19, 20]	513	[895, 896]	1017	[1515, 1516]	1521	[389, 420]
10	[21, 21]	514	[897, 898]	1018	[724, 762]	1522	[270, 1877]
11	[22, 23]	515	[411, 899]	1019	[684, 1371]	1523	[1732, 907]
12	[24, 25]	516	[900, 901]	1020	[1517, 1518]	1524	[1798, 837]
13	[26, 27]	517	[902, 292]	1021	[1519, 1520]	1525	[1686, 1840]
14	[28, 29]	518	[903, 904]	1022	[1521, 1522]	1526	[1718, 418]
15	[30, 31]	519	[905, 906]	1023	[1473, 150]	1527	[250, 1697]
16	[32, 33]	520	[907, 908]	1024	[1523, 1229]	1528	[1878, 109]
17	[34, 35]	521	[909, 832]	1025	[472, 1318]	1529	[1137, 1768]
18	[36, 37]	522	[910, 911]	1026	[1369, 1524]	1530	[1859, 1879]
19	[38, 39]	523	[912, 913]	1027	[1446, 1525]	1531	[1880, 1800]
20	[40, 41]	524	[402, 914]	1028	[1526, 1527]	1532	[25, 1789]
21	[42, 43]	525	[403, 430]	1029	[1528, 522]	1533	[1780, 1783]
22	[44, 45]	526	[915, 916]	1030	[1529, 1530]	1534	[1095, 1878]
23	[46, 47]	527	[917, 879]	1031	[1531, 1532]	1535	[1801, 373]
24	[48, 49]	528	[918, 819]	1032	[1379, 1533]	1536	[1723, 1845]
25	[50, 51]	529	[812, 919]	1033	[151, 1534]	1537	[429, 317]
26	[52, 53]	530	[920, 921]	1034	[1331, 616]	1538	[431, 897]
27	[54, 55]	531	[922, 303]	1035	[1491, 1535]	1539	[1663, 1881]
28	[56, 57]	532	[923, 924]	1036	[227, 1536]	1540	[1882, 1769]
29	[49, 58]	533	[925, 926]	1037	[1537, 1538]	1541	[310, 1762]
30	[59, 60]	534	[78, 860]	1038	[1539, 1540]	1542	[1662, 1880]
31	[61, 62]	535	[330, 399]	1039	[1541, 1523]	1543	[1676, 1883]
32	[63, 64]	536	[927, 928]	1040	[1397, 1264]	1544	[1770, 1884]
33	[65, 66]	537	[929, 930]	1041	[1441, 482]	1545	[1705, 1876]

34	[67, 68]	538	[931, 371]	1042	[1357, 580]	1546	[1025, 785]
35	[69, 70]	539	[932, 933]	1043	[445, 678]	1547	[1744, 1029]
36	[71, 72]	540	[934, 935]	1044	[1516, 1335]	1548	[1741, 1200]
37	[73, 74]	541	[375, 936]	1045	[1530, 1542]	1549	[1885, 1810]
38	[75, 76]	542	[937, 938]	1046	[1543, 1544]	1550	[1206, 1659]
39	[77, 78]	543	[939, 888]	1047	[1545, 1519]	1551	[320, 1886]
40	[79, 80]	544	[940, 941]	1048	[1546, 514]	1552	[1823, 1181]
41	[81, 82]	545	[942, 943]	1049	[586, 1490]	1553	[1874, 1887]
42	[83, 84]	546	[944, 945]	1050	[1547, 1416]	1554	[1158, 971]
43	[85, 86]	547	[946, 947]	1051	[1548, 1214]	1555	[1888, 424]
44	[87, 88]	548	[948, 949]	1052	[1549, 1550]	1556	[999, 1060]
45	[89, 90]	549	[950, 951]	1053	[1527, 1551]	1557	[1811, 1736]
46	[91, 92]	550	[952, 953]	1054	[581, 134]	1558	[1889, 1119]
47	[93, 94]	551	[945, 954]	1055	[1552, 1429]	1559	[1664, 95]
48	[95, 96]	552	[955, 956]	1056	[1553, 224]	1560	[1109, 1792]
49	[97, 98]	553	[957, 958]	1057	[182, 1393]	1561	[1871, 1785]
50	[99, 100]	554	[959, 960]	1058	[1554, 1555]	1562	[1890, 1875]
51	[101, 102]	555	[961, 962]	1059	[662, 642]	1563	[1891, 841]
52	[103, 104]	556	[963, 24]	1060	[1556, 632]	1564	[1852, 1068]
53	[105, 106]	557	[964, 965]	1061	[1557, 1396]	1565	[1194, 1108]
54	[107, 108]	558	[966, 910]	1062	[631, 1438]	1566	[1844, 1848]
55	[109, 110]	559	[967, 968]	1063	[1558, 683]	1567	[962, 1892]
56	[111, 112]	560	[846, 969]	1064	[1231, 1545]	1568	[1053, 1063]
57	[113, 114]	561	[970, 889]	1065	[605, 1559]	1569	[1168, 1893]
58	[115, 116]	562	[971, 972]	1066	[652, 687]	1570	[1677, 1094]
59	[117, 118]	563	[973, 886]	1067	[643, 1560]	1571	[72, 856]
60	[119, 120]	564	[239, 974]	1068	[1561, 1343]	1572	[1015, 815]
61	[121, 31]	565	[975, 976]	1069	[1562, 1563]	1573	[1835, 1894]
62	[122, 123]	566	[977, 821]	1070	[1520, 1258]	1574	[1895, 1896]
63	[124, 125]	567	[978, 784]	1071	[637, 639]	1575	[1897, 1836]
64	[126, 127]	568	[916, 979]	1072	[1564, 640]	1576	[1135, 1777]
65	[128, 129]	569	[416, 980]	1073	[1565, 1566]	1577	[1896, 1898]
66	[130, 131]	570	[981, 982]	1074	[653, 1249]	1578	[1899, 1873]
67	[132, 133]	571	[983, 984]	1075	[1504, 1567]	1579	[300, 1900]
68	[134, 135]	572	[985, 799]	1076	[1435, 1568]	1580	[398, 942]
69	[136, 137]	573	[986, 987]	1077	[157, 1564]	1581	[1166, 1870]
70	[138, 139]	574	[363, 988]	1078	[629, 624]	1582	[1893, 1740]
71	[140, 141]	575	[863, 989]	1079	[1411, 1569]	1583	[419, 414]
72	[142, 143]	576	[990, 991]	1080	[1570, 1571]	1584	[1892, 1901]
73	[144, 145]	577	[871, 408]	1081	[1327, 1448]	1585	[834, 851]
74	[146, 147]	578	[911, 992]	1082	[1572, 465]	1586	[1902, 797]
75	[148, 149]	579	[286, 251]	1083	[1573, 1574]	1587	[68, 1866]
76	[150, 151]	580	[993, 994]	1084	[1485, 1575]	1588	[936, 1799]
77	[152, 153]	581	[995, 341]	1085	[1576, 1577]	1589	[1867, 847]

78	[154, 155]	582	[996, 333]	1086	[576, 1578]	1590	[1903, 60]
79	[156, 157]	583	[997, 998]	1087	[1579, 1580]	1591	[1904, 975]
80	[158, 159]	584	[816, 999]	1088	[1569, 622]	1592	[786, 275]
81	[160, 161]	585	[1000, 1001]	1089	[1568, 655]	1593	[1731, 232]
82	[162, 163]	586	[833, 1002]	1090	[537, 1501]	1594	[312, 1132]
83	[164, 165]	587	[836, 386]	1091	[1421, 1581]	1595	[1141, 1905]
84	[166, 167]	588	[894, 1003]	1092	[1452, 764]	1596	[1858, 1040]
85	[168, 169]	589	[1004, 271]	1093	[1317, 1548]	1597	[1906, 1907]
86	[149, 170]	590	[1005, 828]	1094	[1567, 1582]	1598	[1719, 1908]
87	[171, 172]	591	[805, 1006]	1095	[1583, 215]	1599	[874, 1909]
88	[173, 174]	592	[1007, 1008]	1096	[1584, 1531]	1600	[88, 1910]
89	[175, 176]	593	[377, 113]	1097	[680, 160]	1601	[1143, 893]
90	[177, 178]	594	[1009, 438]	1098	[1585, 486]	1602	[1905, 1082]
91	[179, 180]	595	[1010, 1011]	1099	[692, 1586]	1603	[278, 1843]
92	[181, 182]	596	[1012, 1013]	1100	[35, 1587]	1604	[1861, 1107]
93	[183, 184]	597	[391, 1014]	1101	[1403, 1588]	1605	[960, 1071]
94	[185, 186]	598	[956, 1015]	1102	[1426, 1310]	1606	[1011, 1088]
95	[187, 188]	599	[1016, 1017]	1103	[1449, 191]	1607	[387, 1911]
96	[189, 190]	600	[930, 986]	1104	[1589, 1557]	1608	[1179, 61]
97	[191, 192]	601	[1018, 1019]	1105	[1590, 1591]	1609	[1912, 4]
98	[193, 194]	602	[1020, 970]	1106	[1592, 538]	1610	[1671, 1184]
99	[195, 196]	603	[1021, 1022]	1107	[1362, 753]	1611	[1182, 884]
100	[197, 198]	604	[1023, 261]	1108	[1593, 1594]	1612	[1006, 1760]
101	[199, 200]	605	[1024, 1025]	1109	[155, 1457]	1613	[1872, 1733]
102	[201, 202]	606	[1026, 105]	1110	[706, 1595]	1614	[814, 1869]
103	[203, 204]	607	[882, 436]	1111	[1334, 1596]	1615	[1913, 1895]
104	[205, 206]	608	[949, 1027]	1112	[1597, 1598]	1616	[1818, 813]
105	[207, 208]	609	[829, 1028]	1113	[1219, 459]	1617	[1907, 301]
106	[209, 210]	610	[1029, 1030]	1114	[621, 1503]	1618	[74, 1688]
107	[211, 212]	611	[1031, 412]	1115	[1599, 1217]	1619	[771, 1899]
108	[213, 214]	612	[1032, 1033]	1116	[225, 1537]	1620	[385, 1205]
109	[215, 216]	613	[1034, 1035]	1117	[613, 1600]	1621	[1772, 1661]
110	[217, 218]	614	[859, 843]	1118	[1224, 1543]	1622	[1864, 1882]
111	[219, 220]	615	[861, 944]	1119	[1596, 1241]	1623	[1914, 981]
112	[137, 221]	616	[1036, 63]	1120	[1601, 1602]	1624	[80, 1915]
113	[222, 223]	617	[1037, 392]	1121	[1364, 158]	1625	[1204, 1837]
114	[224, 225]	618	[1038, 1039]	1122	[1603, 696]	1626	[1898, 1129]
115	[226, 227]	619	[1040, 809]	1123	[1575, 1604]	1627	[1916, 1709]
116	[228, 229]	620	[1041, 1042]	1124	[1350, 1605]	1628	[262, 1778]
117	[230, 231]	621	[1043, 77]	1125	[1456, 1464]	1629	[1824, 1684]
118	[232, 233]	622	[435, 1044]	1126	[1606, 454]	1630	[1860, 299]
119	[234, 235]	623	[1045, 1046]	1127	[1607, 1513]	1631	[254, 1842]
120	[236, 237]	624	[1047, 1048]	1128	[1608, 121]	1632	[346, 1745]
121	[238, 239]	625	[359, 1049]	1129	[1609, 1294]	1633	[872, 1917]

122	[240, 241]	626	[1050, 1051]	1130	[765, 1610]	1634	[1918, 1914]
123	[242, 73]	627	[968, 1052]	1131	[1493, 1611]	1635	[1901, 1919]
124	[243, 244]	628	[844, 1053]	1132	[1514, 1322]	1636	[1919, 780]
125	[245, 246]	629	[1054, 1055]	1133	[1210, 1466]	1637	[979, 1086]
126	[247, 248]	630	[1056, 263]	1134	[1612, 681]	1638	[1696, 257]
127	[249, 250]	631	[1057, 1058]	1135	[1577, 1432]	1639	[1759, 1724]
128	[251, 252]	632	[1059, 265]	1136	[1273, 1415]	1640	[1070, 1838]
129	[253, 254]	633	[1060, 343]	1137	[550, 1302]	1641	[290, 1062]
130	[255, 256]	634	[293, 1061]	1138	[1340, 1613]	1642	[1920, 234]
131	[257, 258]	635	[348, 891]	1139	[1614, 584]	1643	[1868, 1730]
132	[259, 260]	636	[1062, 22]	1140	[1433, 1615]	1644	[1921, 1885]
133	[261, 262]	637	[1063, 382]	1141	[1616, 1572]	1645	[1100, 806]
134	[263, 264]	638	[1064, 1065]	1142	[1617, 1380]	1646	[1803, 1903]
135	[265, 266]	639	[1066, 384]	1143	[1618, 1239]	1647	[1072, 350]
136	[267, 268]	640	[906, 1067]	1144	[767, 1495]	1648	[1922, 817]
137	[269, 270]	641	[1068, 1069]	1145	[650, 1472]	1649	[919, 281]
138	[271, 272]	642	[1022, 1070]	1146	[1594, 646]	1650	[1720, 1670]
139	[273, 274]	643	[1071, 1072]	1147	[466, 1614]	1651	[1721, 1178]
140	[275, 276]	644	[914, 1073]	1148	[1619, 1620]	1652	[1917, 824]
141	[277, 278]	645	[1074, 978]	1149	[1524, 758]	1653	[282, 776]
142	[279, 280]	646	[1075, 1076]	1150	[1447, 608]	1654	[1877, 845]
143	[281, 282]	647	[1013, 1077]	1151	[664, 181]	1655	[1923, 993]
144	[283, 284]	648	[1078, 1079]	1152	[1621, 1622]	1656	[104, 1888]
145	[285, 286]	649	[1080, 807]	1153	[1613, 596]	1657	[1924, 517]
146	[287, 288]	650	[850, 1081]	1154	[504, 1417]	1658	[730, 598]
147	[289, 290]	651	[1082, 1083]	1155	[1463, 54]	1659	[1925, 1926]
148	[291, 253]	652	[1084, 1085]	1156	[1623, 228]	1660	[229, 1505]
149	[292, 293]	653	[808, 1080]	1157	[1228, 1624]	1661	[1927, 729]
150	[98, 294]	654	[413, 927]	1158	[1625, 1626]	1662	[1213, 132]
151	[295, 296]	655	[1086, 1087]	1159	[1373, 1627]	1663	[8, 1928]
152	[297, 298]	656	[1088, 1018]	1160	[455, 1354]	1664	[1637, 1389]
153	[299, 300]	657	[1089, 1090]	1161	[1431, 1628]	1665	[619, 1351]
154	[301, 302]	658	[1091, 1092]	1162	[1629, 1630]	1666	[1484, 718]
155	[303, 304]	659	[1093, 1050]	1163	[667, 201]	1667	[1588, 701]
156	[305, 306]	660	[1033, 287]	1164	[1506, 628]	1668	[1929, 32]
157	[307, 308]	661	[1094, 331]	1165	[1267, 1631]	1669	[1440, 1930]
158	[309, 310]	662	[344, 28]	1166	[1578, 516]	1670	[1642, 1330]
159	[311, 312]	663	[921, 1095]	1167	[1632, 1428]	1671	[1414, 1402]
160	[313, 314]	664	[1096, 1097]	1168	[1633, 1395]	1672	[1635, 1623]
161	[315, 316]	665	[314, 967]	1169	[1488, 1476]	1673	[1246, 1931]
162	[317, 318]	666	[306, 1098]	1170	[1634, 1635]	1674	[1932, 11]
163	[319, 320]	667	[1099, 929]	1171	[457, 1515]	1675	[739, 1933]
164	[100, 321]	668	[18, 1100]	1172	[1566, 1243]	1676	[736, 1230]
165	[322, 323]	669	[298, 1101]	1173	[1636, 1637]	1677	[1598, 1412]

166	[324, 75]	670	[1102, 1103]	1174	[1638, 130]	1678	[1233, 1425]
167	[325, 326]	671	[1104, 1105]	1175	[39, 1639]	1679	[741, 1934]
168	[327, 328]	672	[1106, 977]	1176	[676, 1640]	1680	[174, 1298]
169	[329, 330]	673	[96, 426]	1177	[1641, 552]	1681	[1610, 1404]
170	[331, 332]	674	[1107, 849]	1178	[1297, 1638]	1682	[1533, 1632]
171	[333, 334]	675	[1108, 1109]	1179	[679, 122]	1683	[1348, 766]
172	[335, 336]	676	[1110, 1111]	1180	[1628, 1642]	1684	[1934, 1935]
173	[337, 338]	677	[1112, 89]	1181	[167, 693]	1685	[1936, 471]
174	[339, 340]	678	[1113, 240]	1182	[1643, 456]	1686	[1937, 1938]
175	[341, 342]	679	[989, 242]	1183	[1644, 140]	1687	[1939, 1549]
176	[343, 344]	680	[252, 315]	1184	[1645, 1646]	1688	[1940, 1941]
177	[345, 346]	681	[1114, 1115]	1185	[1647, 179]	1689	[1376, 1942]
178	[347, 348]	682	[1116, 1117]	1186	[1648, 1649]	1690	[654, 1561]
179	[349, 5]	683	[1118, 990]	1187	[1342, 1437]	1691	[1942, 1943]
180	[350, 351]	684	[1119, 1120]	1188	[1650, 1651]	1692	[573, 1280]
181	[294, 352]	685	[1121, 79]	1189	[660, 626]	1693	[210, 524]
182	[353, 354]	686	[1122, 853]	1190	[1405, 512]	1694	[1649, 1609]
183	[355, 324]	687	[1083, 245]	1191	[509, 1290]	1695	[1944, 1945]
184	[356, 357]	688	[1085, 1123]	1192	[223, 502]	1696	[1571, 489]
185	[358, 359]	689	[1124, 864]	1193	[599, 1372]	1697	[1413, 1306]
186	[360, 361]	690	[1125, 1126]	1194	[1313, 663]	1698	[1361, 446]
187	[362, 363]	691	[260, 996]	1195	[1383, 671]	1699	[1946, 528]
188	[364, 365]	692	[783, 1127]	1196	[711, 703]	1700	[1947, 1292]
189	[366, 367]	693	[380, 1128]	1197	[1624, 1652]	1701	[1494, 505]
190	[368, 369]	694	[1129, 1130]	1198	[1653, 488]	1702	[118, 1459]
191	[82, 370]	695	[870, 1031]	1199	[139, 759]	1703	[1948, 1260]
192	[371, 372]	696	[1131, 329]	1200	[194, 540]	1704	[1470, 217]
193	[373, 374]	697	[976, 422]	1201	[1420, 1654]	1705	[1604, 1436]
194	[233, 375]	698	[1132, 1133]	1202	[1454, 1655]	1706	[449, 1949]
195	[376, 377]	699	[421, 434]	1203	[1582, 34]	1707	[1950, 651]
196	[296, 378]	700	[1134, 1135]	1204	[1544, 195]	1708	[712, 1385]
197	[379, 380]	701	[1136, 920]	1205	[686, 40]	1709	[1951, 648]
198	[66, 381]	702	[1105, 1137]	1206	[658, 574]	1710	[1952, 1953]
199	[382, 383]	703	[1008, 368]	1207	[743, 138]	1711	[1954, 1541]
200	[384, 385]	704	[1138, 1139]	1208	[1555, 1656]	1712	[1955, 1648]
201	[386, 387]	705	[1140, 1141]	1209	[1657, 1658]	1713	[1222, 1492]
202	[388, 389]	706	[1142, 1143]	1210	[1659, 1660]	1714	[1265, 1956]
203	[390, 391]	707	[1028, 1144]	1211	[1661, 1662]	1715	[531, 620]
204	[392, 231]	708	[876, 946]	1212	[4, 1663]	1716	[1957, 1377]
205	[393, 394]	709	[1145, 985]	1213	[1120, 1664]	1717	[1497, 737]
206	[395, 396]	710	[1146, 952]	1214	[1665, 866]	1718	[1958, 1959]
207	[397, 398]	711	[1147, 1138]	1215	[1073, 1666]	1719	[1960, 1565]
208	[399, 400]	712	[1148, 1149]	1216	[1667, 1668]	1720	[1961, 1583]
209	[401, 402]	713	[1027, 1150]	1217	[1669, 345]	1721	[571, 733]

210	[235, 403]	714	[1081, 1151]	1218	[1670, 1671]	1722	[1406, 1962]
211	[404, 405]	715	[76, 1152]	1219	[924, 804]	1723	[1508, 1963]
212	[406, 407]	716	[1153, 1142]	1220	[1191, 1672]	1724	[633, 175]
213	[408, 409]	717	[1154, 923]	1221	[1673, 875]	1725	[1656, 1554]
214	[410, 411]	718	[840, 1155]	1222	[409, 1674]	1726	[708, 1964]
215	[412, 413]	719	[1156, 1157]	1223	[1675, 1676]	1727	[1654, 1296]
216	[414, 415]	720	[316, 1158]	1224	[241, 1677]	1728	[1386, 1965]
217	[374, 416]	721	[988, 1159]	1225	[788, 1678]	1729	[1966, 1547]
218	[417, 366]	722	[980, 1160]	1226	[1192, 1116]	1730	[749, 1407]
219	[418, 419]	723	[1161, 267]	1227	[769, 1679]	1731	[1332, 1967]
220	[420, 421]	724	[1160, 903]	1228	[383, 337]	1732	[1336, 1398]
221	[422, 423]	725	[1162, 1163]	1229	[1680, 909]	1733	[1329, 1584]
222	[424, 425]	726	[276, 1164]	1230	[1681, 961]	1734	[476, 1358]
223	[426, 427]	727	[1165, 1166]	1231	[1682, 1683]	1735	[519, 1944]
224	[428, 429]	728	[1167, 1168]	1232	[1684, 1685]	1736	[1535, 1968]
225	[430, 431]	729	[1169, 1170]	1233	[6, 85]	1737	[1959, 742]
226	[432, 433]	730	[1171, 1016]	1234	[1003, 1093]	1738	[647, 1579]
227	[434, 435]	731	[890, 1172]	1235	[1065, 1686]	1739	[1926, 661]
228	[436, 437]	732	[1173, 1174]	1236	[885, 1687]	1740	[1252, 42]
229	[438, 439]	733	[951, 26]	1237	[1688, 1689]	1741	[204, 1283]
230	[440, 441]	734	[288, 1175]	1238	[1690, 1038]	1742	[1244, 1606]
231	[442, 443]	735	[318, 1176]	1239	[258, 1691]	1743	[1969, 1552]
232	[444, 445]	736	[1177, 1106]	1240	[1046, 1099]	1744	[1482, 1529]
233	[446, 447]	737	[112, 397]	1241	[1692, 1693]	1745	[1465, 52]
234	[448, 449]	738	[1178, 1173]	1242	[974, 1171]	1746	[474, 1593]
235	[57, 450]	739	[1128, 1179]	1243	[823, 983]	1747	[1962, 1612]
236	[451, 452]	740	[321, 417]	1244	[302, 794]	1748	[527, 1300]
237	[58, 453]	741	[1103, 1180]	1245	[1097, 1694]	1749	[625, 1479]
238	[454, 455]	742	[899, 259]	1246	[423, 1695]	1750	[1534, 1970]
239	[456, 457]	743	[1181, 1182]	1247	[1198, 1696]	1751	[33, 197]
240	[221, 458]	744	[332, 1183]	1248	[1697, 1698]	1752	[1971, 1253]
241	[459, 460]	745	[394, 789]	1249	[1699, 1005]	1753	[1424, 1475]
242	[461, 146]	746	[1184, 1185]	1250	[1700, 1681]	1754	[1972, 1607]
243	[165, 462]	747	[1186, 877]	1251	[1701, 1161]	1755	[1512, 441]
244	[463, 464]	748	[1187, 1188]	1252	[110, 362]	1756	[1945, 1223]
245	[465, 466]	749	[367, 1189]	1253	[1702, 1154]	1757	[1311, 1469]
246	[467, 468]	750	[1190, 1004]	1254	[1703, 1136]	1758	[1956, 1973]
247	[469, 470]	751	[1170, 1191]	1255	[1704, 1705]	1759	[1269, 1597]
248	[471, 472]	752	[114, 1192]	1256	[880, 107]	1760	[1964, 1974]
249	[473, 474]	753	[365, 802]	1257	[1706, 1707]	1761	[1289, 1450]
250	[475, 476]	754	[1193, 1194]	1258	[1708, 1703]	1762	[1408, 1947]
251	[477, 478]	755	[898, 782]	1259	[992, 1056]	1763	[1263, 1461]
252	[479, 480]	756	[848, 917]	1260	[1709, 1177]	1764	[1941, 657]
253	[178, 481]	757	[1195, 1074]	1261	[796, 835]	1765	[1626, 477]

254	[482, 483]	758	[86, 1196]	1262	[1710, 1711]	1766	[1445, 604]
255	[484, 485]	759	[1197, 1198]	1263	[1712, 1713]	1767	[1532, 1349]
256	[486, 487]	760	[1199, 769]	1264	[1714, 376]	1768	[1975, 744]
257	[488, 444]	761	[1200, 285]	1265	[1715, 1716]	1769	[1976, 1977]
258	[489, 490]	762	[1201, 1113]	1266	[892, 313]	1770	[688, 1969]
259	[491, 492]	763	[1087, 1202]	1267	[1717, 1718]	1771	[1646, 699]
260	[212, 493]	764	[1203, 1204]	1268	[264, 772]	1772	[1293, 1304]
261	[494, 495]	765	[1205, 1206]	1269	[1067, 1719]	1773	[541, 1978]
262	[496, 497]	766	[1133, 1207]	1270	[1180, 1720]	1774	[200, 1619]
263	[498, 499]	767	[1001, 1208]	1271	[831, 1721]	1775	[1580, 209]
264	[500, 501]	768	[1209, 741]	1272	[1722, 1723]	1776	[1949, 1592]
265	[502, 503]	769	[593, 1210]	1273	[1724, 1112]	1777	[1622, 1539]
266	[43, 504]	770	[1211, 1212]	1274	[1725, 1057]	1778	[607, 1979]
267	[505, 8]	771	[589, 1213]	1275	[1726, 1727]	1779	[497, 1287]
268	[506, 507]	772	[499, 577]	1276	[1139, 1153]	1780	[649, 1980]
269	[508, 509]	773	[1214, 494]	1277	[998, 1728]	1781	[170, 1251]
270	[510, 511]	774	[1215, 709]	1278	[248, 1197]	1782	[535, 207]
271	[512, 513]	775	[751, 1216]	1279	[1729, 902]	1783	[757, 1952]
272	[514, 515]	776	[1217, 1218]	1280	[1730, 1124]	1784	[1439, 536]
273	[516, 517]	777	[533, 1219]	1281	[855, 1731]	1785	[1655, 590]
274	[518, 519]	778	[1220, 1221]	1282	[857, 1732]	1786	[1980, 740]
275	[520, 521]	779	[568, 1222]	1283	[1733, 957]	1787	[1284, 636]
276	[522, 523]	780	[1223, 1224]	1284	[1030, 1064]	1788	[1536, 1453]
277	[524, 525]	781	[732, 177]	1285	[90, 349]	1789	[760, 1946]
278	[526, 527]	782	[1225, 1226]	1286	[1734, 830]	1790	[51, 164]
279	[528, 469]	783	[218, 644]	1287	[868, 1735]	1791	[1540, 1981]
280	[481, 529]	784	[1227, 1228]	1288	[1736, 1737]	1792	[1965, 1645]
281	[530, 531]	785	[1229, 520]	1289	[969, 1738]	1793	[1600, 1937]
282	[532, 533]	786	[1230, 1231]	1290	[1149, 1739]	1794	[1651, 1951]
283	[534, 535]	787	[1232, 1233]	1291	[1740, 1741]	1795	[220, 559]
284	[536, 537]	788	[1234, 1235]	1292	[958, 1742]	1796	[1422, 707]
285	[538, 539]	789	[702, 530]	1293	[237, 1186]	1797	[135, 1268]
286	[540, 541]	790	[163, 1236]	1294	[941, 1201]	1798	[529, 1603]
287	[542, 124]	791	[214, 448]	1295	[1743, 1744]	1799	[1467, 634]
288	[543, 544]	792	[1237, 1238]	1296	[1745, 1746]	1800	[755, 556]
289	[545, 56]	793	[1239, 1240]	1297	[1098, 255]	1801	[1477, 669]
290	[546, 532]	794	[1241, 226]	1298	[1747, 1748]	1802	[1602, 1950]
291	[547, 548]	795	[565, 1242]	1299	[340, 1749]	1803	[1968, 193]
292	[549, 550]	796	[1243, 1244]	1300	[775, 1750]	1804	[1502, 1509]
293	[551, 205]	797	[1245, 1246]	1301	[84, 1751]	1805	[1291, 1982]
294	[552, 553]	798	[587, 1247]	1302	[982, 1752]	1806	[665, 1961]
295	[554, 555]	799	[682, 1248]	1303	[1753, 67]	1807	[747, 1507]
296	[556, 542]	800	[1249, 1250]	1304	[1742, 1125]	1808	[1587, 1498]
297	[557, 558]	801	[1251, 722]	1305	[1754, 1755]	1809	[1236, 219]

298	[559, 461]	802	[656, 1252]	1306	[1756, 1725]	1810	[1983, 1590]
299	[560, 561]	803	[1253, 9]	1307	[1123, 1704]	1811	[1418, 1955]
300	[53, 562]	804	[1254, 1255]	1308	[1757, 1758]	1812	[1451, 659]
301	[562, 563]	805	[1256, 1257]	1309	[790, 1759]	1813	[120, 545]
302	[564, 565]	806	[717, 546]	1310	[1760, 327]	1814	[1430, 1496]
303	[501, 566]	807	[1258, 1259]	1311	[352, 1761]	1815	[1321, 1570]
304	[567, 568]	808	[1260, 1261]	1312	[1762, 1041]	1816	[1982, 1957]
305	[525, 569]	809	[1262, 1263]	1313	[1126, 1024]	1817	[37, 1621]
306	[570, 571]	810	[1264, 1265]	1314	[810, 1763]	1818	[1639, 1272]
307	[572, 573]	811	[1266, 1267]	1315	[1764, 1726]	1819	[1984, 1939]
308	[574, 575]	812	[1268, 1269]	1316	[1765, 1766]	1820	[1574, 1576]
309	[460, 576]	813	[1270, 1271]	1317	[1767, 1665]	1821	[511, 1468]
310	[577, 578]	814	[1272, 1273]	1318	[1761, 915]	1822	[1640, 1985]
311	[579, 473]	815	[1259, 1274]	1319	[1768, 1743]	1823	[623, 1328]
312	[580, 581]	816	[1275, 1276]	1320	[1769, 1770]	1824	[566, 1936]
313	[582, 583]	817	[1277, 710]	1321	[1771, 1772]	1825	[1928, 668]
314	[584, 585]	818	[1278, 1279]	1322	[1176, 1773]	1826	[1978, 1616]
315	[478, 586]	819	[1280, 746]	1323	[415, 1714]	1827	[1538, 600]
316	[480, 587]	820	[1281, 1282]	1324	[1069, 862]	1828	[1935, 183]
317	[588, 589]	821	[1283, 1284]	1325	[1678, 273]	1829	[1586, 1419]
318	[590, 479]	822	[1285, 1286]	1326	[1774, 1775]	1830	[1943, 685]
319	[591, 592]	823	[1287, 1288]	1327	[1707, 1776]	1831	[1522, 1375]
320	[176, 560]	824	[127, 1289]	1328	[1777, 1690]	1832	[1423, 1338]
321	[196, 593]	825	[123, 36]	1329	[1752, 1169]	1833	[453, 1339]
322	[594, 595]	826	[1290, 1291]	1330	[1778, 1779]	1834	[1427, 1986]
323	[596, 597]	827	[1292, 1293]	1331	[820, 1780]	1835	[1987, 1617]
324	[598, 599]	828	[45, 579]	1332	[1055, 19]	1836	[1988, 1556]
325	[600, 48]	829	[1294, 1295]	1333	[381, 1712]	1837	[615, 705]
326	[470, 601]	830	[1296, 484]	1334	[106, 1692]	1838	[1563, 1960]
327	[602, 603]	831	[1247, 1297]	1335	[1668, 1781]	1839	[1967, 1932]
328	[604, 605]	832	[1298, 1299]	1336	[1782, 1026]	1840	[1559, 1546]
329	[606, 607]	833	[1300, 1301]	1337	[280, 247]	1841	[1499, 1270]
330	[608, 609]	834	[1302, 1303]	1338	[336, 1767]	1842	[1551, 1989]
331	[610, 118]	835	[1304, 689]	1339	[1738, 1782]	1843	[1990, 1966]
332	[611, 612]	836	[1305, 534]	1340	[793, 1012]	1844	[1525, 1954]
333	[145, 613]	837	[1306, 1307]	1341	[913, 410]	1845	[1314, 635]
334	[614, 615]	838	[1308, 1309]	1342	[1783, 1010]	1846	[1963, 1643]
335	[616, 617]	839	[1310, 1311]	1343	[1784, 811]	1847	[1981, 1399]
336	[618, 619]	840	[1312, 1313]	1344	[1785, 774]	1848	[462, 1988]
337	[620, 621]	841	[464, 1314]	1345	[1152, 279]	1849	[1344, 1958]
338	[622, 623]	842	[1315, 189]	1346	[272, 1786]	1850	[441, 1227]
339	[624, 625]	843	[1316, 1317]	1347	[1787, 1710]	1851	[1500, 1983]
340	[626, 627]	844	[1318, 675]	1348	[795, 1699]	1852	[1953, 1562]
341	[628, 185]	845	[1212, 1319]	1349	[1208, 1788]	1853	[1938, 1462]

342	[539, 629]	846	[1320, 1321]	1350	[1789, 1790]	1854	[1630, 1232]
343	[630, 631]	847	[1322, 1323]	1351	[1039, 1791]	1855	[578, 543]
344	[632, 633]	848	[1324, 1325]	1352	[1792, 925]	1856	[1216, 1220]
345	[634, 50]	849	[1326, 1327]	1353	[1793, 1078]	1857	[1970, 1528]
346	[635, 44]	850	[719, 750]	1354	[1794, 295]	1858	[698, 1478]
347	[563, 547]	851	[1328, 1237]	1355	[1795, 1020]	1859	[1471, 756]
348	[636, 637]	852	[1303, 1329]	1356	[1155, 1794]	1860	[1401, 1444]
349	[638, 518]	853	[1330, 1331]	1357	[1164, 995]	1861	[1257, 1326]
350	[639, 199]	854	[186, 1332]	1358	[1796, 1680]	1862	[1301, 1487]
351	[640, 641]	855	[1333, 1334]	1359	[1797, 283]	1863	[1346, 1517]
352	[642, 643]	856	[1335, 1336]	1360	[396, 1110]	1864	[513, 1976]
353	[644, 602]	857	[143, 1337]	1361	[1077, 937]	1865	[452, 1987]
354	[125, 645]	858	[1338, 1316]	1362	[1090, 1717]	1866	[133, 691]
355	[517, 148]	859	[1339, 1340]	1363	[777, 1798]	1867	[1581, 1971]
356	[646, 647]	860	[1288, 1341]	1364	[1042, 311]	1868	[131, 506]
357	[443, 567]	861	[521, 1342]	1365	[1799, 1669]	1869	[1271, 1650]
358	[648, 649]	862	[1343, 1344]	1366	[1800, 1801]	1870	[1631, 1526]
359	[487, 650]	863	[1345, 508]	1367	[1788, 955]	1871	[1480, 1215]
360	[651, 652]	864	[1279, 1346]	1368	[1076, 309]	1872	[1248, 1378]
361	[585, 653]	865	[1347, 1348]	1369	[1666, 1802]	1873	[1221, 1585]
362	[216, 654]	866	[1349, 1350]	1370	[1737, 1803]	1874	[1989, 203]
363	[655, 638]	867	[1351, 463]	1371	[803, 905]	1875	[1627, 1948]
364	[55, 656]	868	[1286, 1352]	1372	[1804, 931]	1876	[1991, 496]
365	[657, 658]	869	[1353, 748]	1373	[1185, 1805]	1877	[1443, 1320]
366	[659, 660]	870	[1354, 46]	1374	[70, 770]	1878	[1390, 1991]
367	[661, 128]	871	[1355, 1315]	1375	[1687, 1806]	1879	[1550, 1382]
368	[603, 662]	872	[184, 166]	1376	[1807, 401]	1880	[523, 1633]
369	[663, 664]	873	[1356, 1347]	1377	[1808, 997]	1881	[159, 1442]
370	[161, 665]	874	[1261, 1357]	1378	[1117, 1037]	1882	[12, 1634]
371	[595, 570]	875	[1358, 1359]	1379	[867, 839]	1883	[1933, 1608]
372	[666, 667]	876	[745, 1360]	1380	[1809, 1043]	1884	[561, 1278]
373	[668, 467]	877	[208, 1361]	1381	[1790, 115]	1885	[1387, 1589]
374	[669, 670]	878	[188, 1362]	1382	[1810, 1104]	1886	[1309, 714]
375	[671, 672]	879	[458, 211]	1383	[378, 1682]	1887	[569, 1975]
376	[673, 222]	880	[1363, 1364]	1384	[334, 428]	1888	[1992, 1625]
377	[674, 500]	881	[672, 1365]	1385	[1698, 1036]	1889	[1595, 1601]
378	[675, 676]	882	[1366, 1356]	1386	[887, 818]	1890	[1458, 1940]
379	[677, 510]	883	[555, 1367]	1387	[1035, 1811]	1891	[1474, 2]
380	[678, 679]	884	[1368, 1369]	1388	[92, 322]	1892	[1518, 618]
381	[129, 680]	885	[1370, 611]	1389	[400, 900]	1893	[1360, 721]
382	[681, 682]	886	[601, 119]	1390	[1812, 1199]	1894	[1986, 1984]
383	[683, 684]	887	[1371, 1234]	1391	[1196, 393]	1895	[1985, 1993]
384	[685, 686]	888	[1372, 1373]	1392	[354, 966]	1896	[1994, 1521]
385	[687, 688]	889	[1374, 666]	1393	[1813, 1814]	1897	[1510, 1353]

386	[689, 690]	890	[1375, 1376]	1394	[1815, 1165]	1898	[1993, 1558]
387	[691, 692]	891	[1377, 582]	1395	[1735, 778]	1899	[1973, 1629]
388	[693, 694]	892	[1378, 1379]	1396	[1746, 939]	1900	[1977, 1409]
389	[695, 213]	893	[1380, 154]	1397	[1816, 1715]	1901	[1611, 1618]
390	[696, 697]	894	[1381, 720]	1398	[1781, 16]	1902	[198, 38]
391	[597, 698]	895	[1382, 1383]	1399	[1817, 335]	1903	[1930, 1644]
392	[699, 700]	896	[1384, 1355]	1400	[1127, 1756]	1904	[627, 1481]
393	[701, 702]	897	[752, 1225]	1401	[246, 1147]	1905	[1615, 1573]
394	[703, 704]	898	[1385, 1386]	1402	[372, 1818]	1906	[1931, 1653]
395	[705, 706]	899	[483, 1387]	1403	[901, 959]	1907	[1591, 564]
396	[707, 708]	900	[493, 1388]	1404	[1819, 1820]	1908	[1560, 1647]
397	[709, 594]	901	[1389, 1390]	1405	[987, 895]	1909	[1605, 13]
398	[710, 711]	902	[1391, 551]	1406	[1151, 950]	1910	[1652, 1483]
399	[495, 712]	903	[1392, 557]	1407	[369, 1059]	1911	[1365, 1599]
400	[609, 713]	904	[1393, 1394]	1408	[1144, 1667]	1912	[31, 1972]
401	[714, 715]	905	[1395, 173]	1409	[357, 1815]	1913	[202, 1994]
402	[716, 717]	906	[1396, 695]	1410	[1821, 964]	1914	[1542, 1927]
403	[718, 719]	907	[728, 1397]	1411	[1773, 1822]	1915	[1511, 1553]
404	[10, 716]	908	[1398, 606]	1412	[791, 1146]	1916	[1367, 1641]
405	[720, 673]	909	[1399, 1400]	1413	[1806, 1823]	1917	[1218, 1992]
406	[721, 526]	910	[645, 1401]	1414	[1674, 291]	1918	[641, 1486]
407	[722, 723]	911	[1400, 1277]	1415	[433, 1729]	1919	[14, 168]
408	[723, 724]	912	[1402, 1403]	1416	[328, 1075]	1920	[1276, 1990]
409	[2, 152]	913	[1404, 1405]	1417	[1802, 1706]	1921	[1620, 591]
410	[558, 725]	914	[715, 1406]	1418	[1092, 1824]	1922	[468, 1925]
411	[507, 726]	915	[1407, 1408]	1419	[1825, 1807]	1923	[1974, 1929]
412	[180, 727]	916	[1409, 1410]	1420	[1826, 1757]	1924	[1995, 291]
413	[617, 728]	917	[1323, 1411]	1421	[351, 101]	1925	[1828, 854]
414	[729, 730]	918	[490, 1281]	1422	[1695, 1827]	1926	[1763, 826]
415	[731, 732]	919	[1412, 1413]	1423	[947, 1765]	1927	[1910, 1203]
416	[733, 734]	920	[172, 1414]	1424	[1827, 353]	1928	[16, 1912]
417	[735, 736]	921	[1415, 677]	1425	[1685, 1828]	1929	[1174, 65]
418	[737, 491]	922	[1416, 610]	1426	[1829, 1813]	1930	[1755, 932]
419	[738, 731]	923	[1307, 1254]	1427	[1693, 1830]	1931	[1694, 81]
420	[694, 739]	924	[1417, 1256]	1428	[908, 1831]	1932	[1996, 243]
421	[740, 741]	925	[1388, 1418]	1429	[933, 1747]	1933	[935, 1122]
422	[742, 743]	926	[1419, 1420]	1430	[1832, 1833]	1934	[1658, 355]
423	[744, 442]	927	[727, 1421]	1431	[781, 1118]	1935	[1865, 1921]
424	[206, 745]	928	[1337, 1422]	1432	[1044, 1809]	1936	[1854, 1918]
425	[746, 747]	929	[192, 1423]	1433	[1834, 1835]	1937	[842, 236]
426	[748, 738]	930	[503, 1424]	1434	[1776, 360]	1938	[1879, 1121]
427	[190, 749]	931	[1425, 187]	1435	[865, 1812]	1939	[1997, 1819]
428	[750, 588]	932	[1226, 1426]	1436	[1836, 869]	1940	[284, 1089]
429	[553, 751]	933	[700, 1427]	1437	[1837, 97]	1941	[1207, 319]

430	[450, 752]	934	[1428, 1308]	1438	[994, 1784]	1942	[1908, 1853]
431	[753, 754]	935	[1429, 1430]	1439	[1838, 388]	1943	[1900, 238]
432	[515, 755]	936	[447, 1431]	1440	[1839, 356]	1944	[904, 297]
433	[756, 757]	937	[763, 1363]	1441	[926, 1140]	1945	[308, 71]
434	[758, 475]	938	[1432, 1433]	1442	[1840, 1817]	1946	[838, 379]
435	[759, 760]	939	[1434, 1435]	1443	[827, 1771]	1947	[1998, 111]
436	[690, 761]	940	[1436, 674]	1444	[773, 1023]	1948	[1805, 91]
437	[762, 763]	941	[1437, 572]	1445	[1728, 1096]	1949	[1886, 1916]
438	[764, 765]	942	[1438, 1439]	1446	[1841, 1162]	1950	[1820, 1084]
439	[766, 767]	943	[169, 1440]	1447	[370, 1796]	1951	[1909, 1700]
440	[768, 769]	944	[1341, 1370]	1448	[1775, 1148]	1952	[1159, 1890]
441	[770, 771]	945	[754, 1441]	1449	[1679, 1054]	1953	[244, 1891]
442	[772, 773]	946	[1442, 1443]	1450	[1842, 1841]	1954	[965, 881]
443	[774, 775]	947	[1444, 1445]	1451	[116, 307]	1955	[102, 1131]
444	[776, 777]	948	[1235, 1446]	1452	[1843, 1007]	1956	[1883, 1922]
445	[778, 779]	949	[548, 1447]	1453	[1822, 1844]	1957	[1766, 1902]
446	[780, 781]	950	[1448, 1434]	1454	[1845, 1846]	1958	[1791, 963]
447	[782, 783]	951	[1255, 554]	1455	[1079, 1722]	1959	[1183, 1832]
448	[784, 390]	952	[575, 451]	1456	[1847, 395]	1960	[1683, 1923]
449	[785, 786]	953	[41, 1449]	1457	[1848, 1034]	1961	[1175, 305]
450	[787, 788]	954	[1450, 1451]	1458	[437, 1849]	1962	[1911, 1114]
451	[789, 790]	955	[1242, 1452]	1459	[231, 1850]	1963	[1150, 1826]
452	[779, 791]	956	[1453, 1454]	1460	[1851, 1793]	1964	[1189, 347]
453	[792, 793]	957	[1455, 1305]	1461	[1711, 1852]	1965	[1779, 1032]
454	[794, 795]	958	[725, 1456]	1462	[1019, 1774]	1966	[20, 1839]
455	[108, 796]	959	[1457, 1458]	1463	[1853, 912]	1967	[361, 1066]
456	[797, 798]	960	[1459, 1460]	1464	[1163, 1854]	1968	[1862, 1851]
457	[799, 800]	961	[1461, 1374]	1465	[954, 1855]	1969	[938, 1047]
458	[801, 406]	962	[1462, 1463]	1466	[943, 1701]	1970	[1884, 1847]
459	[802, 803]	963	[1464, 1465]	1467	[1751, 99]	1971	[1061, 1996]
460	[804, 805]	964	[1466, 1467]	1468	[1188, 1193]	1972	[60, 1702]
461	[806, 289]	965	[1468, 1266]	1469	[27, 934]	1973	[323, 1156]
462	[807, 808]	966	[1469, 1470]	1470	[822, 1658]	1974	[972, 1167]
463	[809, 810]	967	[583, 171]	1471	[342, 1821]	1975	[1887, 1906]
464	[811, 812]	968	[485, 1471]	1472	[852, 792]	1976	[1157, 325]
465	[813, 814]	969	[1472, 1473]	1473	[1758, 93]	1977	[896, 1195]
466	[815, 816]	970	[1394, 1474]	1474	[1739, 1675]	1978	[1130, 1804]
467	[817, 364]	971	[1475, 1245]	1475	[1101, 404]	1979	[1855, 1863]
468	[818, 87]	972	[1476, 1477]	1476	[1856, 1857]	1980	[1850, 1897]
469	[64, 83]	973	[1478, 1262]	1477	[953, 1102]	1981	[1881, 1825]
470	[819, 820]	974	[734, 1381]	1478	[1014, 1858]	1982	[1814, 1808]
471	[821, 822]	975	[1479, 1480]	1479	[1048, 1021]	1983	[1749, 1904]
472	[23, 823]	976	[1481, 1482]	1480	[1049, 1145]	1984	[1830, 277]
473	[824, 825]	977	[1483, 1285]	1481	[1051, 922]	1985	[1111, 1889]

474	[826, 827]	978	[141, 1484]	1482	[1052, 1859]	1986	[1894, 1997]
475	[828, 829]	979	[670, 1485]	1483	[1727, 1734]	1987	[1831, 1913]
476	[830, 831]	980	[1410, 1392]	1484	[883, 1860]	1988	[1716, 1998]
477	[832, 833]	981	[1486, 1324]	1485	[878, 1861]	1989	[1115, 1816]
478	[326, 834]	982	[1487, 1488]	1486	[266, 1829]	1990	[1915, 269]
479	[835, 836]	983	[1295, 136]	1487	[1750, 1856]	1991	[991, 873]
480	[837, 838]	984	[153, 1489]	1488	[1660, 1753]	1992	[1172, 1834]
481	[839, 840]	985	[1490, 1491]	1489	[1857, 1009]	1993	[1058, 1920]
482	[841, 842]	986	[612, 156]	1490	[1672, 1787]	1994	[62, 801]
483	[843, 844]	987	[1492, 1384]	1491	[1002, 1862]	1995	[1999, 178]
484	[845, 846]	988	[1460, 1455]	1492	[1863, 1795]	1996	[1359, 1312]
485	[847, 848]	989	[761, 144]	1493	[405, 1864]	1997	[1979, 1636]
486	[849, 850]	990	[1325, 1493]	1494	[825, 17]	1998	[1319, 1211]
487	[851, 852]	991	[1489, 1368]	1495	[1849, 1190]	1999	[2000, 839]
488	[853, 339]	992	[47, 498]	1496	[338, 787]	2000	[2001, 1312]
489	[854, 855]	993	[1282, 1494]	1497	[1833, 858]	2001	[2002, 1126]
490	[856, 857]	994	[1495, 1366]	1498	[1713, 1865]	2002	[2003, 1523]
491	[858, 859]	995	[726, 735]	1499	[1866, 1797]	2003	[2004, 1680]
492	[860, 861]	996	[492, 614]	1500	[1748, 1134]	2004	[2005, 1399]
493	[862, 863]	997	[1496, 1497]	1501	[928, 1091]	2005	[2006, 1127]
494	[864, 865]	998	[1498, 1499]	1502	[29, 1000]	2006	[2007, 1945]
495	[866, 867]	999	[1274, 630]	1503	[1202, 973]	2007	[2008, 1675]
496	[274, 868]	1000	[544, 142]	1504	[984, 1045]	2008	[2009, 736]
497	[869, 870]	1001	[713, 126]	1505	[304, 1867]	2009	[2010, 1681]
498	[407, 871]	1002	[1299, 1500]	1506	[256, 358]	2010	[2011, 1461]
499	[94, 872]	1003	[592, 549]	1507	[1017, 249]	2011	[2012, 70]
500	[873, 874]	1004	[1501, 162]	1508	[427, 1868]	2012	[1, 1211]
501	[875, 103]	1005	[697, 1502]	1509	[268, 1754]		
502	[425, 876]	1006	[1503, 1333]	1510	[1869, 1187]		
503	[877, 878]	1007	[147, 1504]	1511	[1689, 1764]		

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	336	0	672	1	1008	0	1344	1	1680	0
1	0	337	0	673	0	1009	0	1345	1	1681	1
2	1	338	0	674	1	1010	1	1346	0	1682	1
3	0	339	0	675	0	1011	1	1347	1	1683	1
4	1	340	0	676	0	1012	1	1348	1	1684	0
5	1	341	1	677	1	1013	0	1349	0	1685	1
6	0	342	0	678	0	1014	0	1350	1	1686	0
7	0	343	1	679	0	1015	0	1351	1	1687	1
8	0	344	0	680	0	1016	1	1352	0	1688	0
9	1	345	1	681	1	1017	1	1353	0	1689	0
10	1	346	1	682	0	1018	0	1354	0	1690	1

11	1	347	0	683	1	1019	1	1355	1	1691	1
12	1	348	1	684	1	1020	1	1356	1	1692	1
13	0	349	1	685	0	1021	0	1357	0	1693	0
14	0	350	0	686	1	1022	0	1358	1	1694	1
15	0	351	1	687	0	1023	0	1359	1	1695	1
16	0	352	0	688	0	1024	0	1360	1	1696	0
17	0	353	1	689	1	1025	1	1361	1	1697	0
18	1	354	0	690	1	1026	1	1362	1	1698	1
19	1	355	0	691	1	1027	1	1363	1	1699	0
20	1	356	1	692	1	1028	1	1364	0	1700	1
21	1	357	1	693	0	1029	1	1365	0	1701	0
22	1	358	0	694	1	1030	1	1366	1	1702	1
23	1	359	0	695	0	1031	1	1367	0	1703	0
24	1	360	0	696	0	1032	1	1368	1	1704	1
25	0	361	1	697	1	1033	0	1369	1	1705	0
26	0	362	1	698	1	1034	0	1370	0	1706	0
27	1	363	0	699	1	1035	0	1371	1	1707	0
28	0	364	0	700	0	1036	1	1372	1	1708	0
29	1	365	1	701	0	1037	1	1373	0	1709	0
30	0	366	0	702	1	1038	0	1374	0	1710	0
31	1	367	1	703	0	1039	1	1375	1	1711	1
32	0	368	0	704	0	1040	0	1376	0	1712	1
33	0	369	1	705	0	1041	0	1377	0	1713	1
34	0	370	1	706	0	1042	0	1378	0	1714	0
35	1	371	1	707	1	1043	1	1379	1	1715	0
36	1	372	1	708	0	1044	0	1380	0	1716	1
37	0	373	1	709	0	1045	0	1381	1	1717	0
38	1	374	0	710	1	1046	0	1382	0	1718	1
39	1	375	1	711	0	1047	0	1383	0	1719	1
40	1	376	0	712	0	1048	1	1384	0	1720	1
41	0	377	1	713	1	1049	0	1385	1	1721	0
42	1	378	0	714	0	1050	0	1386	1	1722	1
43	1	379	1	715	1	1051	1	1387	0	1723	0
44	1	380	0	716	0	1052	0	1388	1	1724	0
45	1	381	0	717	0	1053	1	1389	0	1725	0
46	1	382	1	718	1	1054	0	1390	1	1726	0
47	0	383	1	719	0	1055	0	1391	0	1727	0
48	1	384	0	720	0	1056	1	1392	0	1728	1
49	1	385	0	721	1	1057	1	1393	1	1729	1
50	0	386	1	722	0	1058	0	1394	1	1730	1
51	1	387	1	723	0	1059	0	1395	1	1731	0
52	0	388	0	724	0	1060	0	1396	1	1732	0
53	0	389	0	725	0	1061	0	1397	0	1733	0
54	1	390	0	726	0	1062	1	1398	1	1734	1

55	0	391	0	727	0	1063	0	1399	0	1735	1
56	0	392	1	728	1	1064	1	1400	1	1736	0
57	0	393	0	729	1	1065	0	1401	1	1737	0
58	1	394	0	730	0	1066	0	1402	1	1738	0
59	0	395	0	731	1	1067	0	1403	0	1739	1
60	1	396	1	732	0	1068	0	1404	0	1740	0
61	1	397	0	733	1	1069	1	1405	0	1741	1
62	0	398	1	734	1	1070	1	1406	1	1742	0
63	0	399	0	735	1	1071	0	1407	1	1743	0
64	1	400	0	736	0	1072	0	1408	1	1744	0
65	0	401	0	737	0	1073	1	1409	1	1745	1
66	1	402	0	738	0	1074	0	1410	0	1746	1
67	0	403	1	739	0	1075	1	1411	1	1747	0
68	0	404	1	740	1	1076	1	1412	1	1748	1
69	1	405	0	741	1	1077	1	1413	0	1749	0
70	0	406	1	742	0	1078	0	1414	1	1750	0
71	1	407	0	743	0	1079	1	1415	1	1751	0
72	0	408	0	744	1	1080	1	1416	0	1752	0
73	0	409	1	745	0	1081	0	1417	0	1753	1
74	0	410	1	746	1	1082	0	1418	0	1754	1
75	1	411	1	747	0	1083	0	1419	0	1755	1
76	1	412	0	748	0	1084	0	1420	1	1756	0
77	1	413	1	749	1	1085	0	1421	1	1757	0
78	0	414	1	750	0	1086	0	1422	1	1758	0
79	1	415	1	751	0	1087	0	1423	0	1759	0
80	0	416	1	752	0	1088	1	1424	1	1760	0
81	0	417	1	753	1	1089	1	1425	1	1761	1
82	1	418	0	754	1	1090	1	1426	1	1762	1
83	1	419	0	755	1	1091	1	1427	0	1763	1
84	1	420	1	756	1	1092	0	1428	1	1764	0
85	1	421	1	757	0	1093	0	1429	0	1765	0
86	1	422	0	758	1	1094	1	1430	0	1766	1
87	1	423	1	759	0	1095	0	1431	0	1767	0
88	0	424	0	760	1	1096	1	1432	0	1768	1
89	1	425	1	761	0	1097	0	1433	0	1769	1
90	1	426	0	762	1	1098	0	1434	1	1770	0
91	1	427	0	763	0	1099	1	1435	1	1771	1
92	1	428	0	764	1	1100	1	1436	1	1772	1
93	0	429	1	765	1	1101	0	1437	0	1773	1
94	0	430	0	766	1	1102	1	1438	1	1774	0
95	1	431	1	767	1	1103	1	1439	1	1775	1
96	0	432	1	768	0	1104	1	1440	1	1776	1
97	1	433	1	769	1	1105	1	1441	0	1777	0
98	1	434	1	770	1	1106	1	1442	1	1778	1

99	0	435	0	771	0	1107	1	1443	0	1779	0
100	1	436	1	772	0	1108	0	1444	0	1780	1
101	1	437	1	773	0	1109	1	1445	1	1781	1
102	1	438	1	774	1	1110	0	1446	1	1782	0
103	0	439	1	775	0	1111	0	1447	1	1783	0
104	0	440	0	776	1	1112	1	1448	1	1784	1
105	0	441	1	777	1	1113	0	1449	1	1785	1
106	0	442	0	778	1	1114	1	1450	1	1786	1
107	1	443	1	779	1	1115	1	1451	1	1787	1
108	0	444	1	780	0	1116	0	1452	0	1788	0
109	0	445	1	781	0	1117	0	1453	1	1789	1
110	0	446	0	782	1	1118	1	1454	0	1790	1
111	0	447	1	783	1	1119	1	1455	1	1791	1
112	0	448	1	784	1	1120	0	1456	1	1792	0
113	0	449	0	785	0	1121	0	1457	0	1793	0
114	0	450	0	786	1	1122	1	1458	1	1794	0
115	1	451	1	787	0	1123	0	1459	0	1795	1
116	1	452	1	788	1	1124	1	1460	1	1796	1
117	0	453	0	789	1	1125	1	1461	1	1797	1
118	1	454	1	790	1	1126	1	1462	1	1798	1
119	1	455	0	791	1	1127	1	1463	1	1799	0
120	1	456	0	792	0	1128	0	1464	1	1800	1
121	1	457	0	793	0	1129	1	1465	1	1801	0
122	0	458	0	794	1	1130	1	1466	1	1802	0
123	0	459	1	795	1	1131	0	1467	0	1803	1
124	0	460	0	796	1	1132	1	1468	1	1804	1
125	0	461	0	797	0	1133	1	1469	1	1805	0
126	1	462	0	798	1	1134	0	1470	1	1806	0
127	0	463	0	799	0	1135	0	1471	0	1807	0
128	0	464	0	800	0	1136	0	1472	1	1808	0
129	0	465	0	801	0	1137	1	1473	0	1809	0
130	1	466	0	802	1	1138	0	1474	1	1810	0
131	1	467	1	803	1	1139	1	1475	0	1811	0
132	0	468	0	804	0	1140	0	1476	1	1812	1
133	1	469	1	805	1	1141	0	1477	0	1813	1
134	0	470	1	806	0	1142	0	1478	0	1814	0
135	1	471	0	807	0	1143	0	1479	1	1815	1
136	1	472	1	808	0	1144	1	1480	0	1816	0
137	0	473	0	809	0	1145	0	1481	1	1817	0
138	0	474	1	810	0	1146	1	1482	0	1818	0
139	1	475	1	811	0	1147	0	1483	0	1819	0
140	1	476	1	812	1	1148	0	1484	1	1820	0
141	0	477	0	813	0	1149	1	1485	0	1821	0
142	0	478	1	814	1	1150	1	1486	1	1822	1

143	1	479	0	815	0	1151	1	1487	0	1823	0
144	0	480	0	816	0	1152	1	1488	1	1824	0
145	1	481	0	817	1	1153	0	1489	1	1825	0
146	0	482	0	818	0	1154	0	1490	1	1826	1
147	1	483	0	819	1	1155	1	1491	0	1827	1
148	1	484	1	820	0	1156	0	1492	0	1828	1
149	1	485	0	821	0	1157	1	1493	0	1829	1
150	1	486	0	822	1	1158	0	1494	0	1830	0
151	0	487	0	823	1	1159	0	1495	1	1831	0
152	1	488	1	824	0	1160	0	1496	0	1832	0
153	1	489	0	825	0	1161	0	1497	0	1833	0
154	0	490	0	826	1	1162	0	1498	1	1834	0
155	1	491	0	827	0	1163	1	1499	1	1835	0
156	1	492	0	828	1	1164	0	1500	1	1836	1
157	1	493	1	829	0	1165	0	1501	0	1837	0
158	0	494	1	830	1	1166	1	1502	1	1838	1
159	1	495	0	831	0	1167	1	1503	0	1839	1
160	0	496	0	832	0	1168	1	1504	1	1840	1
161	1	497	0	833	0	1169	1	1505	0	1841	1
162	1	498	0	834	0	1170	0	1506	0	1842	1
163	1	499	0	835	0	1171	0	1507	1	1843	0
164	1	500	1	836	1	1172	0	1508	0	1844	0
165	0	501	1	837	0	1173	0	1509	1	1845	0
166	1	502	1	838	0	1174	0	1510	0	1846	1
167	0	503	0	839	0	1175	1	1511	0	1847	1
168	1	504	0	840	1	1176	0	1512	1	1848	0
169	1	505	1	841	0	1177	0	1513	0	1849	1
170	1	506	1	842	0	1178	0	1514	1	1850	1
171	1	507	1	843	0	1179	0	1515	1	1851	1
172	1	508	0	844	1	1180	0	1516	0	1852	0
173	0	509	1	845	1	1181	0	1517	1	1853	1
174	0	510	0	846	1	1182	1	1518	1	1854	1
175	1	511	0	847	0	1183	0	1519	0	1855	1
176	1	512	0	848	1	1184	1	1520	1	1856	1
177	1	513	0	849	0	1185	0	1521	0	1857	1
178	0	514	0	850	0	1186	0	1522	0	1858	1
179	1	515	1	851	0	1187	0	1523	0	1859	0
180	0	516	1	852	1	1188	1	1524	1	1860	1
181	1	517	0	853	1	1189	0	1525	0	1861	0
182	1	518	0	854	0	1190	0	1526	1	1862	1
183	0	519	1	855	0	1191	1	1527	1	1863	0
184	1	520	1	856	0	1192	0	1528	1	1864	0
185	0	521	0	857	1	1193	1	1529	1	1865	1
186	0	522	0	858	0	1194	1	1530	0	1866	1

187	1	523	1	859	0	1195	0	1531	1	1867	1
188	0	524	0	860	0	1196	0	1532	0	1868	1
189	0	525	1	861	0	1197	0	1533	1	1869	0
190	0	526	1	862	1	1198	0	1534	0	1870	0
191	1	527	1	863	1	1199	1	1535	0	1871	0
192	1	528	0	864	1	1200	0	1536	0	1872	0
193	1	529	1	865	1	1201	1	1537	1	1873	1
194	0	530	1	866	0	1202	0	1538	1	1874	1
195	0	531	0	867	1	1203	1	1539	0	1875	0
196	1	532	0	868	1	1204	0	1540	1	1876	1
197	1	533	1	869	0	1205	1	1541	1	1877	0
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199	1	535	0	871	1	1207	0	1543	0	1879	1
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202	0	538	1	874	1	1210	1	1546	1	1882	1
203	0	539	0	875	1	1211	1	1547	0	1883	0
204	1	540	1	876	0	1212	1	1548	1	1884	1
205	0	541	1	877	0	1213	0	1549	0	1885	0
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207	0	543	1	879	0	1215	1	1551	1	1887	1
208	0	544	1	880	1	1216	1	1552	0	1888	0
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210	0	546	0	882	1	1218	1	1554	0	1890	1
211	1	547	1	883	1	1219	0	1555	0	1891	1
212	1	548	0	884	1	1220	1	1556	0	1892	1
213	0	549	1	885	0	1221	1	1557	0	1893	1
214	1	550	1	886	0	1222	1	1558	0	1894	0
215	0	551	1	887	1	1223	0	1559	1	1895	0
216	1	552	1	888	1	1224	1	1560	1	1896	0
217	0	553	1	889	0	1225	1	1561	0	1897	0
218	1	554	0	890	1	1226	0	1562	1	1898	0
219	0	555	1	891	0	1227	1	1563	1	1899	1
220	1	556	1	892	0	1228	1	1564	0	1900	0
221	0	557	1	893	0	1229	0	1565	1	1901	1
222	0	558	1	894	1	1230	1	1566	0	1902	1
223	0	559	0	895	0	1231	1	1567	1	1903	1
224	0	560	1	896	0	1232	0	1568	1	1904	0
225	0	561	1	897	0	1233	0	1569	1	1905	0
226	1	562	0	898	1	1234	1	1570	1	1906	1
227	1	563	0	899	0	1235	0	1571	0	1907	0
228	1	564	0	900	1	1236	0	1572	0	1908	1
229	1	565	1	901	0	1237	0	1573	0	1909	0
230	0	566	0	902	0	1238	1	1574	0	1910	1

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232	1	568	1	904	1	1240	0	1576	0	1912	1
233	0	569	1	905	1	1241	1	1577	0	1913	0
234	1	570	1	906	1	1242	1	1578	1	1914	0
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236	1	572	1	908	1	1244	0	1580	1	1916	0
237	1	573	1	909	0	1245	0	1581	1	1917	1
238	1	574	0	910	0	1246	1	1582	1	1918	0
239	0	575	1	911	1	1247	0	1583	0	1919	0
240	0	576	0	912	1	1248	0	1584	1	1920	1
241	1	577	1	913	0	1249	0	1585	0	1921	0
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243	0	579	1	915	1	1251	0	1587	0	1923	1
244	0	580	1	916	1	1252	0	1588	1	1924	0
245	0	581	0	917	1	1253	1	1589	1	1925	1
246	1	582	0	918	0	1254	0	1590	1	1926	1
247	1	583	0	919	1	1255	1	1591	0	1927	1
248	0	584	0	920	1	1256	1	1592	1	1928	0
249	0	585	1	921	1	1257	0	1593	0	1929	0
250	1	586	0	922	0	1258	0	1594	1	1930	1
251	0	587	1	923	0	1259	0	1595	0	1931	1
252	0	588	1	924	0	1260	0	1596	1	1932	1
253	0	589	0	925	1	1261	1	1597	1	1933	0
254	0	590	1	926	0	1262	0	1598	1	1934	0
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256	0	592	1	928	0	1264	0	1600	0	1936	1
257	1	593	1	929	1	1265	0	1601	0	1937	0
258	0	594	0	930	0	1266	0	1602	0	1938	1
259	0	595	1	931	1	1267	0	1603	1	1939	1
260	1	596	1	932	0	1268	1	1604	0	1940	0
261	1	597	0	933	0	1269	0	1605	0	1941	0
262	0	598	1	934	1	1270	0	1606	1	1942	1
263	0	599	1	935	0	1271	0	1607	1	1943	0
264	1	600	0	936	1	1272	1	1608	0	1944	1
265	1	601	0	937	0	1273	0	1609	1	1945	0
266	1	602	1	938	0	1274	0	1610	1	1946	0
267	1	603	0	939	1	1275	0	1611	1	1947	1
268	1	604	0	940	1	1276	1	1612	0	1948	0
269	0	605	0	941	0	1277	1	1613	0	1949	1
270	0	606	1	942	1	1278	0	1614	1	1950	0
271	0	607	1	943	1	1279	1	1615	0	1951	0
272	0	608	0	944	0	1280	1	1616	0	1952	0
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275	1	611	1	947	0	1283	0	1619	0	1955	1
276	0	612	1	948	0	1284	1	1620	0	1956	0
277	0	613	0	949	0	1285	1	1621	1	1957	1
278	1	614	0	950	1	1286	1	1622	0	1958	1
279	0	615	0	951	1	1287	1	1623	0	1959	0
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281	1	617	1	953	0	1289	1	1625	0	1961	1
282	0	618	0	954	1	1290	1	1626	0	1962	0
283	0	619	0	955	1	1291	0	1627	0	1963	1
284	0	620	0	956	1	1292	0	1628	0	1964	0
285	1	621	1	957	1	1293	1	1629	0	1965	0
286	1	622	0	958	0	1294	0	1630	1	1966	1
287	0	623	0	959	0	1295	0	1631	0	1967	1
288	1	624	0	960	0	1296	1	1632	1	1968	1
289	1	625	0	961	1	1297	0	1633	1	1969	0
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291	1	627	0	963	1	1299	0	1635	1	1971	0
292	1	628	1	964	1	1300	0	1636	0	1972	1
293	1	629	0	965	1	1301	1	1637	1	1973	1
294	1	630	1	966	1	1302	0	1638	0	1974	1
295	0	631	1	967	0	1303	1	1639	0	1975	1
296	1	632	0	968	0	1304	0	1640	1	1976	1
297	1	633	0	969	1	1305	1	1641	0	1977	0
298	0	634	1	970	1	1306	0	1642	1	1978	1
299	1	635	1	971	0	1307	0	1643	1	1979	1
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302	0	638	1	974	1	1310	0	1646	1	1982	0
303	1	639	0	975	1	1311	0	1647	0	1983	0
304	0	640	1	976	1	1312	1	1648	0	1984	0
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306	1	642	0	978	0	1314	0	1650	1	1986	0
307	1	643	0	979	1	1315	0	1651	0	1987	0
308	0	644	1	980	0	1316	0	1652	1	1988	1
309	0	645	0	981	1	1317	0	1653	0	1989	1
310	1	646	1	982	0	1318	1	1654	0	1990	0
311	1	647	0	983	0	1319	1	1655	1	1991	1
312	1	648	0	984	1	1320	1	1656	0	1992	0
313	0	649	1	985	1	1321	1	1657	0	1993	0
314	0	650	0	986	1	1322	0	1658	0	1994	0
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317	1	653	0	989	0	1325	0	1661	1	1997	1
318	1	654	1	990	0	1326	0	1662	0	1998	1

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325	0	661	1	997	0	1333	0	1669	1	2005	0
326	1	662	0	998	1	1334	0	1670	1	2006	0
327	1	663	1	999	0	1335	0	1671	1	2007	0
328	0	664	1	1000	1	1336	0	1672	1	2008	0
329	1	665	0	1001	1	1337	0	1673	1	2009	0
330	0	666	1	1002	0	1338	0	1674	1	2010	0
331	1	667	1	1003	1	1339	0	1675	0	2011	0
332	1	668	1	1004	0	1340	0	1676	0	2012	0
333	1	669	0	1005	1	1341	0	1677	1		
334	0	670	1	1006	0	1342	0	1678	0		
335	1	671	1	1007	1	1343	1	1679	1		

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