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

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

1. Introduction

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

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

as the limit of the finite continued fractions

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

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

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

admits a continued fraction expansion of form (1.1).

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

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

that we shall denote

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

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

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

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

$$\begin{aligned}
p_0(z) &= z^{21} + z^{19} + z^{18} + z^{14} + z^{13} + z^{12} + z^{11} + z^8 + z^7 + z^6 + z^5 + z^3 + z^2 + z \\
&\quad + 1, \\
p_1(z) &= z^{25} + z^{24} + z^{23} + z^{22} + z^{21} + z^{20} + z^{19} + z^{17} + z^{16} + z^{15} + z^{14} + z^{13} \\
&\quad + z^{12} + z^{10} + z^9 + z^8 + z^4 + z^3 + z^2 + z, \\
p_2(z) &= z^{28} + z^{22} + z^{18} + z^{12} + z^8 + z^6 + z^2 + 1, \\
p_3(z) &= z^{25} + z^{24} + z^{23} + z^{22} + z^{21} + z^{20} + z^{19} + z^{17} + z^{16} + z^{15} + z^{14} + z^{13} \\
&\quad + z^{12} + z^{10} + z^9 + z^8 + z^4 + z^3 + z^2 + z, \\
p_4(z) &= z^{22} + z^{21} + z^{20} + z^{19} + z^{14} + z^{13} + z^{11} + z^7 + z^5 + z^3 + z + 1,
\end{aligned}$$

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

$$\begin{aligned}
p_0(z) &= z^{21} + z^{19} + z^{18} + z^{16} + z^{14} + z^{13} + z^{11} + z^8 + z^7 + z^6 + z^5 + z^4 + z^3 \\
&\quad + z^2 + z + 1, \\
p_1(z) &= z^{25} + z^{24} + z^{23} + z^{22} + z^{21} + z^{20} + z^{19} + z^{17} + z^{16} + z^{15} + z^{14} + z^{13} \\
&\quad + z^{12} + z^{10} + z^9 + z^8 + z^4 + z^3 + z^2 + z, \\
p_2(z) &= z^{28} + z^{22} + z^{18} + z^{12} + z^8 + z^6 + z^2 + 1, \\
p_3(z) &= z^{25} + z^{24} + z^{23} + z^{22} + z^{21} + z^{20} + z^{19} + z^{17} + z^{16} + z^{15} + z^{14} + z^{13} \\
&\quad + z^{12} + z^{10} + z^9 + z^8 + z^4 + z^3 + z^2 + z, \\
p_4(z) &= z^{22} + z^{21} + z^{20} + z^{19} + z^{16} + z^{14} + z^{13} + z^{12} + z^{11} + z^7 + z^5 + z^4 + z^3 \\
&\quad + z + 1.
\end{aligned}$$

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

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

$$\cdots \times x^{\deg(\bar{t}_0)} \begin{pmatrix} \bar{t}_0(1/x) & 1 \\ 1 & 0 \end{pmatrix},$$

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

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

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 $0 \leq i,j \leq 1$ 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 $0 \leq i,j \leq 1$, $T_{i,j}$ 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 $0 \leq i,j \leq 1$, the the coefficients of the polynomial $\phi(M^e,i,j)$ (resp. $\phi(M^o,i,j)$, $\phi(W^e,i,j)$, and $\phi(W^o,i,j)$) are the Padé-Hermite approximants of type

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

of the vector

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

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

for $j > 1$, then there exists a unique solution $f(x) \in \mathbb{F}_2[[x]]$ of $P(x, f(x)) = 0$ that satisfies the initial condition $f_n(x) = \sum_{j=0}^{n-1} a_j x^j$.

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

Lemma 2.1. *We have*

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

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

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

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

Proof. We give the proof of the identity

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

the proofs of the others being similar.

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

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

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

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

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

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

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

Define

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

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

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

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

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

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

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

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

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

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

which can be rewritten as

$$
0 = T[[w]_2] + T[[11w]_2] + T[[100w]_2] + T[[101w]_2] + T[[111w]_2], \tag{2.7}
$$

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

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

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

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

First we calculate an 2-automaton that generates T from its minimal polynomial and its first terms. This automaton has 3074 states; its transition function and output function can be found in the annex. Let $A(s, w)$ denote the state reached after reading w from right to left starting from the state s, and τ the output function. Define

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

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

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

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

$$\begin{aligned} 1 = {} & \tau(A(s, \epsilon)) + \tau(A(s, 11)) + \tau(A(s, 100)) + \tau(A(s, 101)) \\ & + \tau(A(s, 111)), \end{aligned} \tag{2.28}$$
$$\begin{aligned} 0 = {} & \tau(A(s, 1)) + \tau(A(s, 100)) + \tau(A(s, 101)) + \tau(A(s, 110)) \\ & + \tau(A(s, 1000)), \end{aligned} \tag{2.29}$$
$$1 = \tau(A(s, 10)) + \tau(A(s, 11)) + \tau(A(s, 100)) + \tau(A(s, 110))$$

$$+\tau(A(s,1001)), \tag{2.30}$$
$$1=\tau(A(s,1010)), \tag{2.31}$$
$$0=\tau(A(s,1011)), \tag{2.32}$$
$$0=\tau(A(s,\epsilon))+\tau(A(s,1100)), \tag{2.33}$$
$$0=\tau(A(s,1))+\tau(A(s,1101)), \tag{2.34}$$

for $s=A(i,0^{2k})$. We find that $(A(i,0^{36}),E_{36})=(A(i,0^{20}),E_{20})$, so that we only have to verify that identities (2.21) through (2.34) hold for $2\le k\le 18$, 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 $u=2^{2k-1}$,*

$$M_{2k}=M^e[:7u]+x^{2u}M^e[:5u]+x^{3u}M^e[:4u]+x^{4u}M^e[:3u]+x^{7u}R^e,$$
$$W_{2k}=W^e[:7u]+x^{2u}W^e[:5u]+x^{3u}W^e[:4u]+x^{4u}W^e[:3u]+x^{7u}R^e.$$

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

$$M_{2k+1}=M^o[:7u]+x^{2u}M^o[:5u]+x^{3u}M^o[:4u]+x^{4u}M^o[:3u]+x^{7u}R^o,$$
$$W_{2k+1}=W^o[:7u]+x^{2u}W^o[:5u]+x^{3u}W^o[:4u]+x^{4u}W^o[:3u]+x^{7u}R^o.$$

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

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

We give the proof of

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

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

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

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

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

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

$$X:=x^v,$$
$$a_n:=W^e[n\cdot v:(n+1)\cdot v]/X^n,$$

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

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

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

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

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

$$\begin{aligned} q_0(x) &= x^{28} + x^{27} + x^{26} + x^{25} + x^{23} + x^{22} + x^{21} + x^{20} + x^{17} + x^{16} + x^{15} + x^{14} \\ &\quad + x^{10} + x^9 + x^7, \\ q_1(x) &= x^{27} + x^{26} + x^{25} + x^{24} + x^{20} + x^{19} + x^{18} + x^{16} + x^{15} + x^{14} + x^{13} + x^{12} \\ &\quad + x^{11} + x^9 + x^8 + x^7 + x^6 + x^5 + x^4 + x^3, \\ q_2(x) &= x^{28} + x^{26} + x^{22} + x^{20} + x^{16} + x^{10} + x^6 + 1, \\ q_3(x) &= x^{27} + x^{26} + x^{25} + x^{24} + x^{20} + x^{19} + x^{18} + x^{16} + x^{15} + x^{14} + x^{13} + x^{12} \\ &\quad + x^{11} + x^9 + x^8 + x^7 + x^6 + x^5 + x^4 + x^3, \\ q_4(x) &= x^{28} + x^{27} + x^{25} + x^{23} + x^{21} + x^{17} + x^{15} + x^{14} + x^9 + x^8 + x^7 + x^6. \end{aligned}$$

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 216, and substitute it for y in $R(z, y)$, we get a series with valuation smaller than 216, which proves that $R(z,y)$ is not an annihilating polynomial of $f(x)$. Finally, $z^{12}Q(1/z,y)$ is the minimal polynomial of $\mathrm{CF}(a,b)=f(1/z)$. □

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

$$\begin{aligned}
p_0(x) &= x^{144}+x^{142}+x^{140}+x^{136}+x^{134}+x^{130}+x^{116}+x^{108}+x^{100}+x^{98}\\
&\quad +x^{94}+x^{92}+x^{90}+x^{88}+x^{86}+x^{82}+x^{76}+x^{72}+x^{70}+x^{68}+x^{66}\\
&\quad +x^{60}+x^{56}+x^{46}+x^{44}+x^{38}+x^{36},\\
p_3(x) &= x^{142}+x^{136}+x^{130}+x^{128}+x^{126}+x^{124}+x^{122}+x^{120}+x^{114}+x^{112}\\
&\quad +x^{110}+x^{104}+x^{102}+x^{94}+x^{90}+x^{86}+x^{84}+x^{80}+x^{78}+x^{76}+x^{68}\\
&\quad +x^{66}+x^{58}+x^{46}+x^{42}+x^{36}+x^{32}+x^{30}+x^{26}+x^{24}+x^{22}+x^{20},\\
p_6(x) &= x^{142}+x^{140}+x^{138}+x^{132}+x^{130}+x^{128}+x^{122}+x^{118}+x^{116}+x^{110}\\
&\quad +x^{108}+x^{106}+x^{104}+x^{102}+x^{100}+x^{98}+x^{94}+x^{92}+x^{90}+x^{84}\\
&\quad +x^{82}+x^{80}+x^{74}+x^{68}+x^{66}+x^{64}+x^{60}+x^{56}+x^{52}+x^{50}+x^{46}\\
&\quad +x^{42}+x^{40}+x^{24}+x^{14}+x^{10}+x^{6}+1,\\
p_9(x) &= x^{142}+x^{138}+x^{136}+x^{132}+x^{124}+x^{122}+x^{120}+x^{110}+x^{108}+x^{104}\\
&\quad +x^{100}+x^{98}+x^{96}+x^{88}+x^{84}+x^{82}+x^{78}+x^{72}+x^{70}+x^{64}+x^{60}\\
&\quad +x^{54}+x^{44}+x^{42}+x^{38}+x^{30}+x^{24}+x^{20}+x^{16}+x^{10}+x^{8}+x^{6},\\
p_{12}(x) &= x^{144}+x^{128}+x^{120}+x^{112}+x^{64}+x^{48}+x^{40}+x^{16}+x^{8}+1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{147}+x^{146}+x^{143}+x^{142}+x^{141}+x^{140}+x^{135}+x^{134}+x^{126}+x^{125}\\
&\quad +x^{119}+x^{118}+x^{117}+x^{116}+x^{115}+x^{113}+x^{111}+x^{110}+x^{109}\\
&\quad +x^{108}+x^{102}+x^{101}+x^{97}+x^{96}+x^{95}+x^{92}+x^{91}+x^{88}+x^{87}+x^{86}\\
&\quad +x^{85}+x^{82}+x^{81}+x^{80}+x^{79}+x^{77}+x^{76}+x^{73}+x^{71}+x^{69}+x^{68}\\
&\quad +x^{66}+x^{65}+x^{62}+x^{61}+x^{60}+x^{59}+x^{58}+x^{52}+x^{51}+x^{50}+x^{48}\\
&\quad +x^{46}+x^{44}+x^{43}+x^{40}+x^{39},\\
p_3(x) &= x^{138}+x^{135}+x^{134}+x^{133}+x^{132}+x^{129}+x^{128}+x^{127}+x^{126}+x^{124}\\
&\quad +x^{123}+x^{122}+x^{120}+x^{119}+x^{112}+x^{110}+x^{109}+x^{108}+x^{105}\\
&\quad +x^{103}+x^{101}+x^{99}+x^{97}+x^{96}+x^{95}+x^{94}+x^{92}+x^{91}+x^{90}+x^{88}\\
&\quad +x^{87}+x^{80}+x^{78}+x^{77}+x^{76}+x^{73}+x^{71}+x^{69}+x^{67}+x^{66}+x^{65}\\
&\quad +x^{64}+x^{61}+x^{59}+x^{58}+x^{57}+x^{54}+x^{52}+x^{51}+x^{50}+x^{47}+x^{46}\\
&\quad +x^{45}+x^{44}+x^{42}+x^{41}+x^{40}+x^{37}+x^{35}+x^{34}+x^{33}+x^{30}+x^{28}
\end{aligned}$$

$$
\begin{aligned}
&+x^{27},\\
p_6(x) &= x^{141}+x^{140}+x^{139}+x^{136}+x^{129}+x^{128}+x^{126}+x^{123}+x^{122}+x^{120}\\
&+x^{115}+x^{114}+x^{112}+x^{107}+x^{106}+x^{105}+x^{103}+x^{101}+x^{98}+x^{85}\\
&+x^{84}+x^{83}+x^{81}+x^{79}+x^{77}+x^{75}+x^{73}+x^{70}+x^{65}+x^{64}+x^{63}\\
&+x^{60}+x^{51}+x^{50}+x^{48}+x^{47}+x^{46}+x^{44}+x^{41}+x^{40}+x^{39}+x^{37}\\
&+x^{34}+x^{33}+x^{32}+x^{30}+x^{27}+x^{26}+x^{25}+x^{23}+x^{21}+x^{18},\\
p_9(x) &= x^{144}+x^{142}+x^{141}+x^{138}+x^{135}+x^{134}+x^{133}+x^{132}+x^{129}+x^{127}\\
&+x^{126}+x^{125}+x^{124}+x^{121}+x^{120}+x^{119}+x^{118}+x^{116}+x^{115}\\
&+x^{104}+x^{102}+x^{101}+x^{94}+x^{92}+x^{91}+x^{90}+x^{88}+x^{87}+x^{84}+x^{82}\\
&+x^{81}+x^{76}+x^{73}+x^{72}+x^{71}+x^{70}+x^{68}+x^{67}+x^{66}+x^{64}+x^{63}\\
&+x^{62}+x^{60}+x^{59}+x^{58}+x^{55}+x^{53}+x^{51}+x^{50}+x^{49}+x^{42}+x^{40}\\
&+x^{39}+x^{36}+x^{34}+x^{33}+x^{32}+x^{29}+x^{27}+x^{26}+x^{25}+x^{24}+x^{21}\\
&+x^{20}+x^{19}+x^{16}+x^{13}+x^{11}+x^{10}+x^{9},\\
p_{12}(x) &= x^{147}+x^{146}+x^{144}+x^{139}+x^{138}+x^{136}+x^{135}+x^{134}+x^{132}+x^{123}\\
&+x^{122}+x^{120}+x^{119}+x^{118}+x^{116}+x^{115}+x^{114}+x^{112}+x^{67}+x^{66}\\
&+x^{64}+x^{59}+x^{58}+x^{56}+x^{55}+x^{54}+x^{52}+x^{43}+x^{42}+x^{40}+x^{39}\\
&+x^{38}+x^{36}+x^{27}+x^{26}+x^{24}+x^{23}+x^{22}+x^{20}+x^{11}+x^{10}+x^{8}\\
&+x^{7}+x^{6}+x^{4}+x^{3}+x^{2}+1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{147}+x^{146}+x^{143}+x^{142}+x^{141}+x^{140}+x^{135}+x^{134}+x^{126}+x^{125}\\
&+x^{119}+x^{118}+x^{117}+x^{116}+x^{115}+x^{113}+x^{111}+x^{110}+x^{109}\\
&+x^{108}+x^{102}+x^{101}+x^{97}+x^{96}+x^{95}+x^{92}+x^{91}+x^{88}+x^{87}+x^{86}\\
&+x^{85}+x^{82}+x^{81}+x^{80}+x^{79}+x^{77}+x^{76}+x^{73}+x^{71}+x^{69}+x^{68}\\
&+x^{66}+x^{65}+x^{62}+x^{61}+x^{60}+x^{59}+x^{58}+x^{52}+x^{51}+x^{50}+x^{48}\\
&+x^{46}+x^{44}+x^{43}+x^{40}+x^{39},\\
p_3(x) &= x^{138}+x^{135}+x^{134}+x^{133}+x^{132}+x^{129}+x^{128}+x^{127}+x^{126}+x^{124}\\
&+x^{123}+x^{122}+x^{120}+x^{119}+x^{112}+x^{110}+x^{109}+x^{108}+x^{105}\\
&+x^{103}+x^{101}+x^{99}+x^{97}+x^{96}+x^{95}+x^{94}+x^{92}+x^{91}+x^{90}+x^{88}\\
&+x^{87}+x^{80}+x^{78}+x^{77}+x^{76}+x^{73}+x^{71}+x^{69}+x^{67}+x^{66}+x^{65}\\
&+x^{64}+x^{61}+x^{59}+x^{58}+x^{57}+x^{54}+x^{52}+x^{51}+x^{50}+x^{47}+x^{46}\\
&+x^{45}+x^{44}+x^{42}+x^{41}+x^{40}+x^{37}+x^{35}+x^{34}+x^{33}+x^{30}+x^{28}\\
&+x^{27},\\
p_6(x) &= x^{141}+x^{140}+x^{139}+x^{136}+x^{129}+x^{128}+x^{126}+x^{123}+x^{122}+x^{120}\\
&+x^{115}+x^{114}+x^{112}+x^{107}+x^{106}+x^{105}+x^{103}+x^{101}+x^{98}+x^{85}
\end{aligned}
$$

$$
\begin{aligned}
&+ x^{84} + x^{83} + x^{81} + x^{79} + x^{77} + x^{75} + x^{73} + x^{70} + x^{65} + x^{64} + x^{63} \\
&+ x^{60} + x^{51} + x^{50} + x^{48} + x^{47} + x^{46} + x^{44} + x^{41} + x^{40} + x^{39} + x^{37} \\
&+ x^{34} + x^{33} + x^{32} + x^{30} + x^{27} + x^{26} + x^{25} + x^{23} + x^{21} + x^{18}, \\
p_9(x) &= x^{144} + x^{142} + x^{141} + x^{138} + x^{135} + x^{134} + x^{133} + x^{132} + x^{129} + x^{127} \\
&+ x^{126} + x^{125} + x^{124} + x^{121} + x^{120} + x^{119} + x^{118} + x^{116} + x^{115} \\
&+ x^{104} + x^{102} + x^{101} + x^{94} + x^{92} + x^{91} + x^{90} + x^{88} + x^{87} + x^{84} + x^{82} \\
&+ x^{81} + x^{76} + x^{73} + x^{72} + x^{71} + x^{70} + x^{68} + x^{67} + x^{66} + x^{64} + x^{63} \\
&+ x^{62} + x^{60} + x^{59} + x^{58} + x^{55} + x^{53} + x^{51} + x^{50} + x^{49} + x^{42} + x^{40} \\
&+ x^{39} + x^{36} + x^{34} + x^{33} + x^{32} + x^{29} + x^{27} + x^{26} + x^{25} + x^{24} + x^{21} \\
&+ x^{20} + x^{19} + x^{16} + x^{13} + x^{11} + x^{10} + x^{9}, \\
p_{12}(x) &= x^{147} + x^{146} + x^{144} + x^{139} + x^{138} + x^{136} + x^{135} + x^{134} + x^{132} + x^{123} \\
&+ x^{122} + x^{120} + x^{119} + x^{118} + x^{116} + x^{115} + x^{114} + x^{112} + x^{67} + x^{66} \\
&+ x^{64} + x^{59} + x^{58} + x^{56} + x^{55} + x^{54} + x^{52} + x^{43} + x^{42} + x^{40} + x^{39} \\
&+ x^{38} + x^{36} + x^{27} + x^{26} + x^{24} + x^{23} + x^{22} + x^{20} + x^{11} + x^{10} + x^{8} \\
&+ x^{7} + x^{6} + x^{4} + x^{3} + x^{2} + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{150} + x^{146} + x^{144} + x^{140} + x^{138} + x^{130} + x^{126} + x^{124} + x^{110} + x^{108} \\
&+ x^{104} + x^{102} + x^{100} + x^{96} + x^{94} + x^{92} + x^{90} + x^{88} + x^{84} + x^{82} + x^{78} \\
&+ x^{72} + x^{68} + x^{66} + x^{64} + x^{62} + x^{58} + x^{56} + x^{42}, \\
p_3(x) &= x^{148} + x^{146} + x^{144} + x^{138} + x^{110} + x^{106} + x^{102} + x^{100} + x^{98} + x^{96} \\
&+ x^{94} + x^{90} + x^{86} + x^{74} + x^{70} + x^{68} + x^{64} + x^{62} + x^{60} + x^{56} + x^{44} \\
&+ x^{42} + x^{40} + x^{38} + x^{36} + x^{34} + x^{32} + x^{30} + x^{26} + x^{18}, \\
p_6(x) &= x^{148} + x^{146} + x^{140} + x^{136} + x^{134} + x^{130} + x^{126} + x^{122} + x^{118} + x^{114} \\
&+ x^{110} + x^{108} + x^{100} + x^{98} + x^{96} + x^{94} + x^{92} + x^{90} + x^{86} + x^{84} + x^{82} \\
&+ x^{74} + x^{68} + x^{64} + x^{62} + x^{60} + x^{56} + x^{54} + x^{42} + x^{40} + x^{28} + x^{20} \\
&+ x^{18} + x^{16} + x^{12} + x^{8} + x^{4} + 1, \\
p_9(x) &= x^{148} + x^{146} + x^{144} + x^{142} + x^{140} + x^{128} + x^{126} + x^{118} + x^{110} + x^{106} \\
&+ x^{100} + x^{92} + x^{90} + x^{86} + x^{82} + x^{80} + x^{78} + x^{70} + x^{68} + x^{62} + x^{54} \\
&+ x^{52} + x^{48} + x^{44} + x^{42} + x^{40} + x^{32} + x^{28} + x^{26} + x^{22} + x^{16} + x^{14} \\
&+ x^{8} + x^{6}, \\
p_{12}(x) &= x^{150} + x^{148} + x^{144} + x^{118} + x^{116} + x^{112} + x^{70} + x^{68} + x^{64} + x^{6} + x^{4} \\
&+ 1,
\end{aligned}
$$

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

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

$$\begin{aligned}
p_0(x) &= x^{150} + x^{142} + x^{134} + x^{128} + x^{126} + x^{124} + x^{122} + x^{120} + x^{118} + x^{114}\\
&\quad + x^{108} + x^{104} + x^{102} + x^{98} + x^{96} + x^{94} + x^{84} + x^{82} + x^{80} + x^{78} + x^{70}\\
&\quad + x^{66} + x^{64} + x^{62} + x^{60} + x^{58} + x^{56} + x^{52} + x^{48} + x^{44} + x^{40} + x^{38}\\
&\quad + x^{36},\\
p_3(x) &= x^{148} + x^{146} + x^{136} + x^{134} + x^{116} + x^{112} + x^{108} + x^{106} + x^{100} + x^{90}\\
&\quad + x^{88} + x^{86} + x^{84} + x^{82} + x^{80} + x^{72} + x^{54} + x^{52} + x^{48} + x^{46} + x^{42}\\
&\quad + x^{40} + x^{32} + x^{30} + x^{28} + x^{26} + x^{22} + x^{20},\\
p_6(x) &= x^{148} + x^{142} + x^{140} + x^{134} + x^{130} + x^{128} + x^{126} + x^{122} + x^{114} + x^{106}\\
&\quad + x^{104} + x^{102} + x^{98} + x^{96} + x^{94} + x^{92} + x^{88} + x^{86} + x^{84} + x^{80} + x^{78}\\
&\quad + x^{76} + x^{74} + x^{72} + x^{70} + x^{68} + x^{52} + x^{48} + x^{46} + x^{44} + x^{36} + x^{30}\\
&\quad + x^{26} + x^{18} + x^{16} + x^{8} + x^{4} + 1,\\
p_9(x) &= x^{148} + x^{146} + x^{144} + x^{142} + x^{140} + x^{128} + x^{126} + x^{118} + x^{110} + x^{106}\\
&\quad + x^{100} + x^{92} + x^{90} + x^{86} + x^{82} + x^{80} + x^{78} + x^{70} + x^{68} + x^{62} + x^{54}\\
&\quad + x^{52} + x^{48} + x^{44} + x^{42} + x^{40} + x^{32} + x^{28} + x^{26} + x^{22} + x^{16} + x^{14}\\
&\quad + x^{8} + x^{6},\\
p_{12}(x) &= x^{150} + x^{148} + x^{144} + x^{118} + x^{116} + x^{112} + x^{70} + x^{68} + x^{64} + x^{6} + x^{4}\\
&\quad + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{147} + x^{146} + x^{143} + x^{142} + x^{139} + x^{137} + x^{134} + x^{131} + x^{130} + x^{128}\\
&\quad + x^{127} + x^{125} + x^{124} + x^{121} + x^{117} + x^{115} + x^{113} + x^{109} + x^{108}\\
&\quad + x^{107} + x^{104} + x^{102} + x^{101} + x^{97} + x^{96} + x^{93} + x^{91} + x^{90} + x^{89}\\
&\quad + x^{86} + x^{85} + x^{84} + x^{83} + x^{80} + x^{78} + x^{77} + x^{76} + x^{75} + x^{74} + x^{73}\\
&\quad + x^{72} + x^{70} + x^{69} + x^{68} + x^{67} + x^{64} + x^{62} + x^{61} + x^{59} + x^{58} + x^{54}\\
&\quad + x^{52} + x^{50} + x^{49} + x^{48} + x^{47} + x^{43} + x^{40} + x^{39},\\
p_3(x) &= x^{138} + x^{135} + x^{134} + x^{133} + x^{132} + x^{129} + x^{128} + x^{127} + x^{126} + x^{124}\\
&\quad + x^{123} + x^{122} + x^{120} + x^{119} + x^{112} + x^{110} + x^{109} + x^{108} + x^{105}\\
&\quad + x^{103} + x^{101} + x^{99} + x^{97} + x^{96} + x^{95} + x^{94} + x^{92} + x^{91} + x^{90} + x^{88}\\
&\quad + x^{87} + x^{80} + x^{78} + x^{77} + x^{76} + x^{73} + x^{71} + x^{69} + x^{67} + x^{66} + x^{65}\\
&\quad + x^{64} + x^{61} + x^{59} + x^{58} + x^{57} + x^{54} + x^{52} + x^{51} + x^{50} + x^{47} + x^{46}\\
&\quad + x^{45} + x^{44} + x^{42} + x^{41} + x^{40} + x^{37} + x^{35} + x^{34} + x^{33} + x^{30} + x^{28}\\
&\quad + x^{27},\\
p_6(x) &= x^{141} + x^{140} + x^{139} + x^{136} + x^{129} + x^{128} + x^{126} + x^{123} + x^{122} + x^{120}\\
&\quad + x^{115} + x^{114} + x^{112} + x^{107} + x^{106} + x^{105} + x^{103} + x^{101} + x^{98} + x^{85}
\end{aligned}$$

$$
\begin{aligned}
&+ x^{84} + x^{83} + x^{81} + x^{79} + x^{77} + x^{75} + x^{73} + x^{70} + x^{65} + x^{64} + x^{63} \\
&+ x^{60} + x^{51} + x^{50} + x^{48} + x^{47} + x^{46} + x^{44} + x^{41} + x^{40} + x^{39} + x^{37} \\
&+ x^{34} + x^{33} + x^{32} + x^{30} + x^{27} + x^{26} + x^{25} + x^{23} + x^{21} + x^{18}, \\
p_9(x) = {}& x^{144} + x^{142} + x^{141} + x^{138} + x^{135} + x^{134} + x^{133} + x^{132} + x^{129} + x^{127} \\
&+ x^{126} + x^{125} + x^{124} + x^{121} + x^{120} + x^{119} + x^{118} + x^{116} + x^{115} \\
&+ x^{104} + x^{102} + x^{101} + x^{94} + x^{92} + x^{91} + x^{90} + x^{88} + x^{87} + x^{84} + x^{82} \\
&+ x^{81} + x^{76} + x^{73} + x^{72} + x^{71} + x^{70} + x^{68} + x^{67} + x^{66} + x^{64} + x^{63} \\
&+ x^{62} + x^{60} + x^{59} + x^{58} + x^{55} + x^{53} + x^{51} + x^{50} + x^{49} + x^{42} + x^{40} \\
&+ x^{39} + x^{36} + x^{34} + x^{33} + x^{32} + x^{29} + x^{27} + x^{26} + x^{25} + x^{24} + x^{21} \\
&+ x^{20} + x^{19} + x^{16} + x^{13} + x^{11} + x^{10} + x^{9}, \\
p_{12}(x) = {}& x^{147} + x^{146} + x^{144} + x^{139} + x^{138} + x^{136} + x^{135} + x^{134} + x^{132} + x^{123} \\
&+ x^{122} + x^{120} + x^{119} + x^{118} + x^{116} + x^{115} + x^{114} + x^{112} + x^{67} + x^{66} \\
&+ x^{64} + x^{59} + x^{58} + x^{56} + x^{55} + x^{54} + x^{52} + x^{43} + x^{42} + x^{40} + x^{39} \\
&+ x^{38} + x^{36} + x^{27} + x^{26} + x^{24} + x^{23} + x^{22} + x^{20} + x^{11} + x^{10} + x^{8} \\
&+ x^{7} + x^{6} + x^{4} + x^{3} + x^{2} + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) = {}& x^{147} + x^{146} + x^{143} + x^{142} + x^{139} + x^{137} + x^{134} + x^{131} + x^{130} + x^{128} \\
&+ x^{127} + x^{125} + x^{124} + x^{121} + x^{117} + x^{115} + x^{113} + x^{109} + x^{108} \\
&+ x^{107} + x^{104} + x^{102} + x^{101} + x^{97} + x^{96} + x^{93} + x^{91} + x^{90} + x^{89} \\
&+ x^{86} + x^{85} + x^{84} + x^{83} + x^{80} + x^{78} + x^{77} + x^{76} + x^{75} + x^{74} + x^{73} \\
&+ x^{72} + x^{70} + x^{69} + x^{68} + x^{67} + x^{64} + x^{62} + x^{61} + x^{59} + x^{58} + x^{54} \\
&+ x^{52} + x^{50} + x^{49} + x^{48} + x^{47} + x^{43} + x^{40} + x^{39}, \\
p_3(x) = {}& x^{138} + x^{135} + x^{134} + x^{133} + x^{132} + x^{129} + x^{128} + x^{127} + x^{126} + x^{124} \\
&+ x^{123} + x^{122} + x^{120} + x^{119} + x^{112} + x^{110} + x^{109} + x^{108} + x^{105} \\
&+ x^{103} + x^{101} + x^{99} + x^{97} + x^{96} + x^{95} + x^{94} + x^{92} + x^{91} + x^{90} + x^{88} \\
&+ x^{87} + x^{80} + x^{78} + x^{77} + x^{76} + x^{73} + x^{71} + x^{69} + x^{67} + x^{66} + x^{65} \\
&+ x^{64} + x^{61} + x^{59} + x^{58} + x^{57} + x^{54} + x^{52} + x^{51} + x^{50} + x^{47} + x^{46} \\
&+ x^{45} + x^{44} + x^{42} + x^{41} + x^{40} + x^{37} + x^{35} + x^{34} + x^{33} + x^{30} + x^{28} \\
&+ x^{27}, \\
p_6(x) = {}& x^{141} + x^{140} + x^{139} + x^{136} + x^{129} + x^{128} + x^{126} + x^{123} + x^{122} + x^{120} \\
&+ x^{115} + x^{114} + x^{112} + x^{107} + x^{106} + x^{105} + x^{103} + x^{101} + x^{98} + x^{85} \\
&+ x^{84} + x^{83} + x^{81} + x^{79} + x^{77} + x^{75} + x^{73} + x^{70} + x^{65} + x^{64} + x^{63} \\
&+ x^{60} + x^{51} + x^{50} + x^{48} + x^{47} + x^{46} + x^{44} + x^{41} + x^{40} + x^{39} + x^{37} \\
&+ x^{34} + x^{33} + x^{32} + x^{30} + x^{27} + x^{26} + x^{25} + x^{23} + x^{21} + x^{18},
\end{aligned}
$$

$$\begin{aligned}
p_9(x) &= x^{144}+x^{142}+x^{141}+x^{138}+x^{135}+x^{134}+x^{133}+x^{132}+x^{129}+x^{127}\\
&+x^{126}+x^{125}+x^{124}+x^{121}+x^{120}+x^{119}+x^{118}+x^{116}+x^{115}\\
&+x^{104}+x^{102}+x^{101}+x^{94}+x^{92}+x^{91}+x^{90}+x^{88}+x^{87}+x^{84}+x^{82}\\
&+x^{81}+x^{76}+x^{73}+x^{72}+x^{71}+x^{70}+x^{68}+x^{67}+x^{66}+x^{64}+x^{63}\\
&+x^{62}+x^{60}+x^{59}+x^{58}+x^{55}+x^{53}+x^{51}+x^{50}+x^{49}+x^{42}+x^{40}\\
&+x^{39}+x^{36}+x^{34}+x^{33}+x^{32}+x^{29}+x^{27}+x^{26}+x^{25}+x^{24}+x^{21}\\
&+x^{20}+x^{19}+x^{16}+x^{13}+x^{11}+x^{10}+x^{9},\\
p_{12}(x) &= x^{147}+x^{146}+x^{144}+x^{139}+x^{138}+x^{136}+x^{135}+x^{134}+x^{132}+x^{123}\\
&+x^{122}+x^{120}+x^{119}+x^{118}+x^{116}+x^{115}+x^{114}+x^{112}+x^{67}+x^{66}\\
&+x^{64}+x^{59}+x^{58}+x^{56}+x^{55}+x^{54}+x^{52}+x^{43}+x^{42}+x^{40}+x^{39}\\
&+x^{38}+x^{36}+x^{27}+x^{26}+x^{24}+x^{23}+x^{22}+x^{20}+x^{11}+x^{10}+x^{8}\\
&+x^{7}+x^{6}+x^{4}+x^{3}+x^{2}+1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{144}+x^{142}+x^{126}+x^{124}+x^{122}+x^{116}+x^{114}+x^{112}+x^{110}+x^{108}\\
&+x^{104}+x^{100}+x^{96}+x^{90}+x^{88}+x^{86}+x^{82}+x^{78}+x^{76}+x^{74}+x^{68}\\
&+x^{60}+x^{58}+x^{56}+x^{54}+x^{52}+x^{48}+x^{46}+x^{42},\\
p_3(x) &= x^{142}+x^{138}+x^{134}+x^{132}+x^{126}+x^{112}+x^{108}+x^{106}+x^{104}+x^{102}\\
&+x^{100}+x^{98}+x^{94}+x^{88}+x^{80}+x^{76}+x^{74}+x^{72}+x^{70}+x^{68}+x^{66}\\
&+x^{64}+x^{60}+x^{56}+x^{50}+x^{44}+x^{42}+x^{40}+x^{38}+x^{36}+x^{34}+x^{32}\\
&+x^{26}+x^{24}+x^{22}+x^{18},\\
p_6(x) &= x^{142}+x^{134}+x^{132}+x^{128}+x^{118}+x^{116}+x^{114}+x^{112}+x^{108}+x^{102}\\
&+x^{100}+x^{96}+x^{94}+x^{92}+x^{86}+x^{82}+x^{80}+x^{78}+x^{76}+x^{70}+x^{66}\\
&+x^{58}+x^{56}+x^{52}+x^{48}+x^{44}+x^{42}+x^{38}+x^{36}+x^{34}+x^{32}+x^{30}\\
&+x^{28}+x^{24}+x^{20}+x^{18}+x^{16}+x^{14}+x^{12}+x^{10}+x^{6}+1,\\
p_9(x) &= x^{142}+x^{138}+x^{136}+x^{132}+x^{124}+x^{122}+x^{120}+x^{110}+x^{108}+x^{104}\\
&+x^{100}+x^{98}+x^{96}+x^{88}+x^{84}+x^{82}+x^{78}+x^{72}+x^{70}+x^{64}+x^{60}\\
&+x^{54}+x^{44}+x^{42}+x^{38}+x^{30}+x^{24}+x^{20}+x^{16}+x^{10}+x^{8}+x^{6},\\
p_{12}(x) &= x^{144}+x^{128}+x^{120}+x^{112}+x^{64}+x^{48}+x^{40}+x^{16}+x^{8}+1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{147}+x^{146}+x^{145}+x^{141}+x^{140}+x^{137}+x^{135}+x^{132}+x^{131}+x^{129}\\
&+x^{126}+x^{124}+x^{121}+x^{118}+x^{117}+x^{116}+x^{115}+x^{114}+x^{112}\\
&+x^{111}+x^{109}+x^{105}+x^{102}+x^{101}+x^{98}+x^{97}+x^{95}+x^{94}+x^{93}\\
&+x^{92}+x^{87}+x^{84}+x^{80}+x^{79}+x^{78}+x^{77}+x^{76}+x^{75}+x^{71}+x^{69}
\end{aligned}$$

$$
\begin{aligned}
&+ x^{63} + x^{62} + x^{59} + x^{55} + x^{52} + x^{51} + x^{50} + x^{48} + x^{46} + x^{42} + x^{41} \\
&+ x^{39} + x^{36}, \\
p_3(x) = {}& x^{143} + x^{142} + x^{141} + x^{137} + x^{136} + x^{135} + x^{134} + x^{131} + x^{130} + x^{127} \\
&+ x^{125} + x^{124} + x^{123} + x^{122} + x^{121} + x^{120} + x^{118} + x^{117} + x^{116} \\
&+ x^{114} + x^{112} + x^{110} + x^{108} + x^{101} + x^{100} + x^{98} + x^{97} + x^{92} + x^{91} \\
&+ x^{85} + x^{84} + x^{82} + x^{80} + x^{79} + x^{77} + x^{76} + x^{75} + x^{72} + x^{71} + x^{70} \\
&+ x^{69} + x^{67} + x^{66} + x^{65} + x^{64} + x^{63} + x^{61} + x^{55} + x^{50} + x^{47} + x^{45} \\
&+ x^{44} + x^{43} + x^{42} + x^{39} + x^{38} + x^{36} + x^{34} + x^{30} + x^{29} + x^{27} + x^{24}, \\
p_6(x) = {}& x^{145} + x^{144} + x^{141} + x^{140} + x^{139} + x^{138} + x^{137} + x^{136} + x^{135} + x^{134} \\
&+ x^{131} + x^{129} + x^{125} + x^{121} + x^{117} + x^{115} + x^{113} + x^{110} + x^{109} \\
&+ x^{108} + x^{107} + x^{103} + x^{101} + x^{98} + x^{95} + x^{91} + x^{87} + x^{86} + x^{85} \\
&+ x^{84} + x^{83} + x^{82} + x^{80} + x^{79} + x^{78} + x^{73} + x^{71} + x^{70} + x^{66} + x^{62} \\
&+ x^{61} + x^{59} + x^{58} + x^{53} + x^{52} + x^{51} + x^{49} + x^{46} + x^{45} + x^{44} + x^{43} \\
&+ x^{41} + x^{40} + x^{38} + x^{37} + x^{33} + x^{32} + x^{30} + x^{29} + x^{28} + x^{27} + x^{26} \\
&+ x^{24} + x^{23} + x^{22} + x^{21} + x^{20} + x^{19} + x^{18} + x^{17} + x^{16} + x^{15} + x^{12} \\
&+ x^{11} + x^{10} + x^{8} + x^{7} + x^{6} + x^{4} + x^{3} + x^{2} + 1, \\
p_9(x) = {}& x^{143} + x^{142} + x^{140} + x^{139} + x^{138} + x^{136} + x^{135} + x^{134} + x^{132} + x^{127} \\
&+ x^{126} + x^{124} + x^{63} + x^{62} + x^{60} + x^{59} + x^{58} + x^{56} + x^{55} + x^{54} + x^{52} \\
&+ x^{47} + x^{46} + x^{44} + x^{31} + x^{30} + x^{28} + x^{27} + x^{26} + x^{24} + x^{23} + x^{22} \\
&+ x^{20} + x^{15} + x^{14} + x^{12}, \\
p_{12}(x) = {}& x^{147} + x^{146} + x^{144} + x^{143} + x^{142} + x^{140} + x^{127} + x^{126} + x^{124} + x^{123} \\
&+ x^{122} + x^{120} + x^{119} + x^{118} + x^{116} + x^{115} + x^{114} + x^{112} + x^{67} + x^{66} \\
&+ x^{64} + x^{63} + x^{62} + x^{60} + x^{47} + x^{46} + x^{44} + x^{43} + x^{42} + x^{40} + x^{39} \\
&+ x^{38} + x^{36} + x^{31} + x^{30} + x^{28} + x^{15} + x^{14} + x^{12} + x^{11} + x^{10} + x^{8} \\
&+ x^{7} + x^{6} + x^{4} + x^{3} + x^{2} + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) = {}& x^{156} + x^{153} + x^{147} + x^{146} + x^{144} + x^{143} + x^{140} + x^{138} + x^{135} + x^{131} \\
&+ x^{127} + x^{123} + x^{121} + x^{120} + x^{119} + x^{118} + x^{117} + x^{112} + x^{110} \\
&+ x^{109} + x^{108} + x^{107} + x^{105} + x^{104} + x^{102} + x^{101} + x^{99} + x^{98} + x^{97} \\
&+ x^{95} + x^{94} + x^{89} + x^{87} + x^{84} + x^{83} + x^{82} + x^{81} + x^{80} + x^{78} + x^{77} \\
&+ x^{76} + x^{73} + x^{72} + x^{71} + x^{66} + x^{64} + x^{63} + x^{60} + x^{59} + x^{57} + x^{54} \\
&+ x^{53} + x^{51} + x^{50} + x^{49} + x^{47} + x^{45} + x^{44} + x^{41} + x^{40} + x^{39}, \\
p_3(x) = {}& x^{147} + x^{146} + x^{143} + x^{142} + x^{141} + x^{139} + x^{136} + x^{132} + x^{131} + x^{130} \\
&+ x^{128} + x^{127} + x^{126} + x^{125} + x^{124} + x^{122} + x^{119} + x^{118} + x^{117}
\end{aligned}
$$

$$
\begin{aligned}
&+x^{114}+x^{112}+x^{111}+x^{110}+x^{109}+x^{108}+x^{106}+x^{103}+x^{102}\\
&+x^{101}+x^{98}+x^{96}+x^{95}+x^{94}+x^{93}+x^{92}+x^{90}+x^{87}+x^{86}+x^{85}\\
&+x^{82}+x^{80}+x^{79}+x^{78}+x^{77}+x^{76}+x^{75}+x^{67}+x^{66}+x^{63}+x^{62}\\
&+x^{61}+x^{59}+x^{56}+x^{52}+x^{51}+x^{50}+x^{48}+x^{47}+x^{46}+x^{45}+x^{44}\\
&+x^{42}+x^{39}+x^{38}+x^{37}+x^{34}+x^{32}+x^{31}+x^{30}+x^{29}+x^{28}+x^{27},\\
p_6(x)=&\,x^{150}+x^{148}+x^{146}+x^{144}+x^{142}+x^{140}+x^{136}+x^{134}+x^{132}+x^{130}\\
&+x^{128}+x^{126}+x^{114}+x^{112}+x^{100}+x^{98}+x^{94}+x^{92}+x^{86}+x^{84}\\
&+x^{80}+x^{78}+x^{74}+x^{68}+x^{66}+x^{64}+x^{62}+x^{50}+x^{48}+x^{42}+x^{40}\\
&+x^{38}+x^{34}+x^{30}+x^{20}+x^{18},\\
p_9(x)=&\,x^{153}+x^{152}+x^{151}+x^{150}+x^{149}+x^{148}+x^{146}+x^{143}+x^{142}+x^{141}\\
&+x^{138}+x^{136}+x^{135}+x^{134}+x^{133}+x^{132}+x^{130}+x^{127}+x^{126}\\
&+x^{125}+x^{122}+x^{121}+x^{73}+x^{72}+x^{71}+x^{70}+x^{69}+x^{68}+x^{66}+x^{63}\\
&+x^{62}+x^{61}+x^{58}+x^{56}+x^{55}+x^{54}+x^{53}+x^{52}+x^{50}+x^{47}+x^{46}\\
&+x^{45}+x^{42}+x^{40}+x^{39}+x^{38}+x^{37}+x^{36}+x^{34}+x^{31}+x^{30}+x^{29}\\
&+x^{26}+x^{24}+x^{23}+x^{22}+x^{21}+x^{20}+x^{18}+x^{15}+x^{14}+x^{13}+x^{10}\\
&+x^{9},\\
p_{12}(x)=&\,x^{156}+x^{140}+x^{136}+x^{128}+x^{120}+x^{112}+x^{76}+x^{60}+x^{56}+x^{48}\\
&+x^{44}+x^{40}+x^{32}+x^{28}+x^{24}+x^{16}+x^{8}+1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x)=&\,x^{152}+x^{149}+x^{148}+x^{146}+x^{145}+x^{143}+x^{140}+x^{138}+x^{135}+x^{129}\\
&+x^{128}+x^{127}+x^{125}+x^{124}+x^{123}+x^{121}+x^{118}+x^{117}+x^{114}\\
&+x^{113}+x^{112}+x^{110}+x^{109}+x^{108}+x^{106}+x^{104}+x^{103}+x^{101}\\
&+x^{100}+x^{98}+x^{96}+x^{95}+x^{94}+x^{92}+x^{91}+x^{89}+x^{87}+x^{86}+x^{85}\\
&+x^{84}+x^{83}+x^{82}+x^{80}+x^{72}+x^{71}+x^{69}+x^{66}+x^{65}+x^{62}+x^{60}\\
&+x^{59}+x^{58}+x^{54}+x^{49}+x^{45}+x^{41}+x^{40}+x^{39},\\
p_3(x)=&\,x^{143}+x^{142}+x^{137}+x^{134}+x^{133}+x^{132}+x^{130}+x^{127}+x^{126}+x^{125}\\
&+x^{123}+x^{120}+x^{119}+x^{118}+x^{116}+x^{113}+x^{112}+x^{111}+x^{109}\\
&+x^{106}+x^{105}+x^{104}+x^{103}+x^{99}+x^{98}+x^{95}+x^{94}+x^{93}+x^{91}\\
&+x^{88}+x^{87}+x^{86}+x^{84}+x^{81}+x^{80}+x^{79}+x^{77}+x^{74}+x^{73}+x^{72}\\
&+x^{70}+x^{67}+x^{66}+x^{65}+x^{63}+x^{60}+x^{59}+x^{58}+x^{56}+x^{53}+x^{52}\\
&+x^{51}+x^{49}+x^{47}+x^{45}+x^{44}+x^{42}+x^{41}+x^{39}+x^{36}+x^{35}+x^{34}\\
&+x^{32}+x^{31}+x^{30}+x^{29}+x^{28}+x^{27},\\
p_6(x)=&\,x^{146}+x^{144}+x^{132}+x^{130}+x^{126}+x^{124}+x^{112}+x^{110}+x^{106}+x^{104}\\
&+x^{98}+x^{96}+x^{92}+x^{90}+x^{86}+x^{82}+x^{72}+x^{68}+x^{58}+x^{54}+x^{50}
\end{aligned}
$$

$$
\begin{aligned}
&+ x^{48} + x^{44} + x^{40} + x^{36} + x^{32} + x^{28} + x^{26} + x^{20} + x^{18},\\
p_9(x) &= x^{149} + x^{148} + x^{147} + x^{146} + x^{143} + x^{141} + x^{140} + x^{139} + x^{136} + x^{134}\\
&+ x^{133} + x^{132} + x^{129} + x^{127} + x^{126} + x^{125} + x^{122} + x^{121} + x^{69} + x^{68}\\
&+ x^{67} + x^{66} + x^{63} + x^{61} + x^{60} + x^{59} + x^{56} + x^{54} + x^{53} + x^{52} + x^{49}\\
&+ x^{47} + x^{46} + x^{45} + x^{42} + x^{41} + x^{37} + x^{36} + x^{35} + x^{34} + x^{31} + x^{29}\\
&+ x^{28} + x^{27} + x^{24} + x^{22} + x^{21} + x^{20} + x^{17} + x^{15} + x^{14} + x^{13} + x^{10}\\
&+ x^{9},\\
p_{12}(x) &= x^{152} + x^{148} + x^{140} + x^{132} + x^{128} + x^{124} + x^{112} + x^{72} + x^{68} + x^{60}\\
&+ x^{52} + x^{48} + x^{44} + x^{40} + x^{36} + x^{32} + x^{28} + x^{20} + x^{16} + x^{12} + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{147} + x^{146} + x^{145} + x^{143} + x^{142} + x^{140} + x^{138} + x^{136} + x^{135} + x^{132}\\
&+ x^{129} + x^{127} + x^{126} + x^{125} + x^{123} + x^{122} + x^{121} + x^{120} + x^{119}\\
&+ x^{115} + x^{112} + x^{111} + x^{110} + x^{109} + x^{107} + x^{106} + x^{105} + x^{103}\\
&+ x^{99} + x^{98} + x^{97} + x^{96} + x^{93} + x^{91} + x^{90} + x^{88} + x^{87} + x^{86} + x^{85}\\
&+ x^{84} + x^{83} + x^{81} + x^{80} + x^{78} + x^{76} + x^{75} + x^{74} + x^{73} + x^{72} + x^{68}\\
&+ x^{67} + x^{60} + x^{54} + x^{52} + x^{48} + x^{47} + x^{45} + x^{44} + x^{42},\\
p_3(x) &= x^{143} + x^{142} + x^{141} + x^{139} + x^{138} + x^{136} + x^{134} + x^{132} + x^{129} + x^{127}\\
&+ x^{126} + x^{125} + x^{124} + x^{123} + x^{122} + x^{121} + x^{120} + x^{119} + x^{117}\\
&+ x^{114} + x^{113} + x^{108} + x^{107} + x^{106} + x^{104} + x^{101} + x^{100} + x^{98} + x^{96}\\
&+ x^{94} + x^{92} + x^{91} + x^{87} + x^{86} + x^{85} + x^{82} + x^{81} + x^{79} + x^{78} + x^{77}\\
&+ x^{76} + x^{74} + x^{71} + x^{70} + x^{69} + x^{65} + x^{62} + x^{61} + x^{60} + x^{59} + x^{58}\\
&+ x^{57} + x^{52} + x^{50} + x^{49} + x^{48} + x^{45} + x^{43} + x^{42} + x^{35} + x^{33} + x^{31}\\
&+ x^{30} + x^{29} + x^{28} + x^{26},\\
p_6(x) &= x^{145} + x^{144} + x^{143} + x^{142} + x^{140} + x^{138} + x^{137} + x^{135} + x^{134} + x^{131}\\
&+ x^{128} + x^{127} + x^{125} + x^{124} + x^{121} + x^{117} + x^{114} + x^{113} + x^{112}\\
&+ x^{110} + x^{109} + x^{108} + x^{107} + x^{105} + x^{104} + x^{103} + x^{102} + x^{100}\\
&+ x^{94} + x^{92} + x^{91} + x^{84} + x^{83} + x^{81} + x^{79} + x^{77} + x^{76} + x^{75} + x^{71}\\
&+ x^{66} + x^{65} + x^{64} + x^{63} + x^{62} + x^{61} + x^{60} + x^{59} + x^{58} + x^{55} + x^{54}\\
&+ x^{53} + x^{51} + x^{49} + x^{46} + x^{45} + x^{44} + x^{43} + x^{39} + x^{38} + x^{34} + x^{29}\\
&+ x^{28} + x^{25} + x^{24} + x^{23} + x^{19} + x^{17} + x^{16} + x^{14} + x^{11} + x^{10} + x^{8}\\
&+ x^{7} + x^{6} + x^{4} + x^{3} + x^{2} + 1,\\
p_9(x) &= x^{143} + x^{142} + x^{140} + x^{139} + x^{138} + x^{136} + x^{135} + x^{134} + x^{132} + x^{127}\\
&+ x^{126} + x^{124} + x^{63} + x^{62} + x^{60} + x^{59} + x^{58} + x^{56} + x^{55} + x^{54} + x^{52}\\
&+ x^{47} + x^{46} + x^{44} + x^{31} + x^{30} + x^{28} + x^{27} + x^{26} + x^{24} + x^{23} + x^{22}
\end{aligned}
$$

$$
\begin{aligned}
&+ x^{20} + x^{15} + x^{14} + x^{12},\\
p_{12}(x) &= x^{147} + x^{146} + x^{144} + x^{143} + x^{142} + x^{140} + x^{127} + x^{126} + x^{124} + x^{123}\\
&+ x^{122} + x^{120} + x^{119} + x^{118} + x^{116} + x^{115} + x^{114} + x^{112} + x^{67} + x^{66}\\
&+ x^{64} + x^{63} + x^{62} + x^{60} + x^{47} + x^{46} + x^{44} + x^{43} + x^{42} + x^{40} + x^{39}\\
&+ x^{38} + x^{36} + x^{31} + x^{30} + x^{28} + x^{15} + x^{14} + x^{12} + x^{11} + x^{10} + x^{8}\\
&+ x^{7} + x^{6} + x^{4} + x^{3} + x^{2} + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{147} + x^{146} + x^{145} + x^{141} + x^{140} + x^{137} + x^{135} + x^{132} + x^{131} + x^{129}\\
&+ x^{126} + x^{124} + x^{121} + x^{118} + x^{117} + x^{116} + x^{115} + x^{114} + x^{112}\\
&+ x^{111} + x^{109} + x^{105} + x^{102} + x^{101} + x^{98} + x^{97} + x^{95} + x^{94} + x^{93}\\
&+ x^{92} + x^{87} + x^{84} + x^{80} + x^{79} + x^{78} + x^{77} + x^{76} + x^{75} + x^{71} + x^{69}\\
&+ x^{63} + x^{62} + x^{59} + x^{55} + x^{52} + x^{51} + x^{50} + x^{48} + x^{46} + x^{42} + x^{41}\\
&+ x^{39} + x^{36},\\
p_3(x) &= x^{143} + x^{142} + x^{141} + x^{137} + x^{136} + x^{135} + x^{134} + x^{131} + x^{130} + x^{127}\\
&+ x^{125} + x^{124} + x^{123} + x^{122} + x^{121} + x^{120} + x^{118} + x^{117} + x^{116}\\
&+ x^{114} + x^{112} + x^{110} + x^{108} + x^{101} + x^{100} + x^{98} + x^{97} + x^{92} + x^{91}\\
&+ x^{85} + x^{84} + x^{82} + x^{80} + x^{79} + x^{77} + x^{76} + x^{75} + x^{72} + x^{71} + x^{70}\\
&+ x^{69} + x^{67} + x^{66} + x^{65} + x^{64} + x^{63} + x^{61} + x^{55} + x^{50} + x^{47} + x^{45}\\
&+ x^{44} + x^{43} + x^{42} + x^{39} + x^{38} + x^{36} + x^{34} + x^{30} + x^{29} + x^{27} + x^{24},\\
p_6(x) &= x^{145} + x^{144} + x^{141} + x^{140} + x^{139} + x^{138} + x^{137} + x^{136} + x^{135} + x^{134}\\
&+ x^{131} + x^{129} + x^{125} + x^{121} + x^{117} + x^{115} + x^{113} + x^{110} + x^{109}\\
&+ x^{108} + x^{107} + x^{103} + x^{101} + x^{98} + x^{95} + x^{91} + x^{87} + x^{86} + x^{85}\\
&+ x^{84} + x^{83} + x^{82} + x^{80} + x^{79} + x^{78} + x^{73} + x^{71} + x^{70} + x^{66} + x^{62}\\
&+ x^{61} + x^{59} + x^{58} + x^{53} + x^{52} + x^{51} + x^{49} + x^{46} + x^{45} + x^{44} + x^{43}\\
&+ x^{41} + x^{40} + x^{38} + x^{37} + x^{33} + x^{32} + x^{30} + x^{29} + x^{28} + x^{27} + x^{26}\\
&+ x^{24} + x^{23} + x^{22} + x^{21} + x^{20} + x^{19} + x^{18} + x^{17} + x^{16} + x^{15} + x^{12}\\
&+ x^{11} + x^{10} + x^{8} + x^{7} + x^{6} + x^{4} + x^{3} + x^{2} + 1,\\
p_9(x) &= x^{143} + x^{142} + x^{140} + x^{139} + x^{138} + x^{136} + x^{135} + x^{134} + x^{132} + x^{127}\\
&+ x^{126} + x^{124} + x^{63} + x^{62} + x^{60} + x^{59} + x^{58} + x^{56} + x^{55} + x^{54} + x^{52}\\
&+ x^{47} + x^{46} + x^{44} + x^{31} + x^{30} + x^{28} + x^{27} + x^{26} + x^{24} + x^{23} + x^{22}\\
&+ x^{20} + x^{15} + x^{14} + x^{12},\\
p_{12}(x) &= x^{147} + x^{146} + x^{144} + x^{143} + x^{142} + x^{140} + x^{127} + x^{126} + x^{124} + x^{123}\\
&+ x^{122} + x^{120} + x^{119} + x^{118} + x^{116} + x^{115} + x^{114} + x^{112} + x^{67} + x^{66}\\
&+ x^{64} + x^{63} + x^{62} + x^{60} + x^{47} + x^{46} + x^{44} + x^{43} + x^{42} + x^{40} + x^{39}
\end{aligned}
$$

$$+ x^{38} + x^{36} + x^{31} + x^{30} + x^{28} + x^{15} + x^{14} + x^{12} + x^{11} + x^{10} + x^{8} + x^{7} + x^{6} + x^{4} + x^{3} + x^{2} + 1,$$

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

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

$$\begin{aligned}
p_0(x) &= x^{152} + x^{149} + x^{148} + x^{146} + x^{145} + x^{143} + x^{140} + x^{138} + x^{135} + x^{129} \\
&\quad + x^{128} + x^{127} + x^{125} + x^{124} + x^{123} + x^{121} + x^{118} + x^{117} + x^{114} \\
&\quad + x^{113} + x^{112} + x^{110} + x^{109} + x^{108} + x^{106} + x^{104} + x^{103} + x^{101} \\
&\quad + x^{100} + x^{98} + x^{96} + x^{95} + x^{94} + x^{92} + x^{91} + x^{89} + x^{87} + x^{86} + x^{85} \\
&\quad + x^{84} + x^{83} + x^{82} + x^{80} + x^{72} + x^{71} + x^{69} + x^{66} + x^{65} + x^{62} + x^{60} \\
&\quad + x^{59} + x^{58} + x^{54} + x^{49} + x^{45} + x^{41} + x^{40} + x^{39}, \\
p_3(x) &= x^{143} + x^{142} + x^{137} + x^{134} + x^{133} + x^{132} + x^{130} + x^{127} + x^{126} + x^{125} \\
&\quad + x^{123} + x^{120} + x^{119} + x^{118} + x^{116} + x^{113} + x^{112} + x^{111} + x^{109} \\
&\quad + x^{106} + x^{105} + x^{104} + x^{103} + x^{99} + x^{98} + x^{95} + x^{94} + x^{93} + x^{91} \\
&\quad + x^{88} + x^{87} + x^{86} + x^{84} + x^{81} + x^{80} + x^{79} + x^{77} + x^{74} + x^{73} + x^{72} \\
&\quad + x^{70} + x^{67} + x^{66} + x^{65} + x^{63} + x^{60} + x^{59} + x^{58} + x^{56} + x^{53} + x^{52} \\
&\quad + x^{51} + x^{49} + x^{47} + x^{45} + x^{44} + x^{42} + x^{41} + x^{39} + x^{36} + x^{35} + x^{34} \\
&\quad + x^{32} + x^{31} + x^{30} + x^{29} + x^{28} + x^{27}, \\
p_6(x) &= x^{146} + x^{144} + x^{132} + x^{130} + x^{126} + x^{124} + x^{112} + x^{110} + x^{106} + x^{104} \\
&\quad + x^{98} + x^{96} + x^{92} + x^{90} + x^{86} + x^{82} + x^{72} + x^{68} + x^{58} + x^{54} + x^{50} \\
&\quad + x^{48} + x^{44} + x^{40} + x^{36} + x^{32} + x^{28} + x^{26} + x^{20} + x^{18}, \\
p_9(x) &= x^{149} + x^{148} + x^{147} + x^{146} + x^{143} + x^{141} + x^{140} + x^{139} + x^{136} + x^{134} \\
&\quad + x^{133} + x^{132} + x^{129} + x^{127} + x^{126} + x^{125} + x^{122} + x^{121} + x^{69} + x^{68} \\
&\quad + x^{67} + x^{66} + x^{63} + x^{61} + x^{60} + x^{59} + x^{56} + x^{54} + x^{53} + x^{52} + x^{49} \\
&\quad + x^{47} + x^{46} + x^{45} + x^{42} + x^{41} + x^{37} + x^{36} + x^{35} + x^{34} + x^{31} + x^{29} \\
&\quad + x^{28} + x^{27} + x^{24} + x^{22} + x^{21} + x^{20} + x^{17} + x^{15} + x^{14} + x^{13} + x^{10} \\
&\quad + x^{9}, \\
p_{12}(x) &= x^{152} + x^{148} + x^{140} + x^{132} + x^{128} + x^{124} + x^{112} + x^{72} + x^{68} + x^{60} \\
&\quad + x^{52} + x^{48} + x^{44} + x^{40} + x^{36} + x^{32} + x^{28} + x^{20} + x^{16} + x^{12} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{156} + x^{153} + x^{147} + x^{146} + x^{144} + x^{143} + x^{140} + x^{138} + x^{135} + x^{131} \\
&\quad + x^{127} + x^{123} + x^{121} + x^{120} + x^{119} + x^{118} + x^{117} + x^{112} + x^{110} \\
&\quad + x^{109} + x^{108} + x^{107} + x^{105} + x^{104} + x^{102} + x^{101} + x^{99} + x^{98} + x^{97} \\
&\quad + x^{95} + x^{94} + x^{89} + x^{87} + x^{84} + x^{83} + x^{82} + x^{81} + x^{80} + x^{78} + x^{77} \\
&\quad + x^{76} + x^{73} + x^{72} + x^{71} + x^{66} + x^{64} + x^{63} + x^{60} + x^{59} + x^{57} + x^{54}
\end{aligned}$$

$$
\begin{aligned}
&+ x^{53} + x^{51} + x^{50} + x^{49} + x^{47} + x^{45} + x^{44} + x^{41} + x^{40} + x^{39},\\
p_3(x) = {}& x^{147} + x^{146} + x^{143} + x^{142} + x^{141} + x^{139} + x^{136} + x^{132} + x^{131} + x^{130}\\
&+ x^{128} + x^{127} + x^{126} + x^{125} + x^{124} + x^{122} + x^{119} + x^{118} + x^{117}\\
&+ x^{114} + x^{112} + x^{111} + x^{110} + x^{109} + x^{108} + x^{106} + x^{103} + x^{102}\\
&+ x^{101} + x^{98} + x^{96} + x^{95} + x^{94} + x^{93} + x^{92} + x^{90} + x^{87} + x^{86} + x^{85}\\
&+ x^{82} + x^{80} + x^{79} + x^{78} + x^{77} + x^{76} + x^{75} + x^{67} + x^{66} + x^{63} + x^{62}\\
&+ x^{61} + x^{59} + x^{56} + x^{52} + x^{51} + x^{50} + x^{48} + x^{47} + x^{46} + x^{45} + x^{44}\\
&+ x^{42} + x^{39} + x^{38} + x^{37} + x^{34} + x^{32} + x^{31} + x^{30} + x^{29} + x^{28} + x^{27},\\
p_6(x) = {}& x^{150} + x^{148} + x^{146} + x^{144} + x^{142} + x^{140} + x^{136} + x^{134} + x^{132} + x^{130}\\
&+ x^{128} + x^{126} + x^{114} + x^{112} + x^{100} + x^{98} + x^{94} + x^{92} + x^{86} + x^{84}\\
&+ x^{80} + x^{78} + x^{74} + x^{68} + x^{66} + x^{64} + x^{62} + x^{50} + x^{48} + x^{42} + x^{40}\\
&+ x^{38} + x^{34} + x^{30} + x^{20} + x^{18},\\
p_9(x) = {}& x^{153} + x^{152} + x^{151} + x^{150} + x^{149} + x^{148} + x^{146} + x^{143} + x^{142} + x^{141}\\
&+ x^{138} + x^{136} + x^{135} + x^{134} + x^{133} + x^{132} + x^{130} + x^{127} + x^{126}\\
&+ x^{125} + x^{122} + x^{121} + x^{73} + x^{72} + x^{71} + x^{70} + x^{69} + x^{68} + x^{66} + x^{63}\\
&+ x^{62} + x^{61} + x^{58} + x^{56} + x^{55} + x^{54} + x^{53} + x^{52} + x^{50} + x^{47} + x^{46}\\
&+ x^{45} + x^{42} + x^{40} + x^{39} + x^{38} + x^{37} + x^{36} + x^{34} + x^{31} + x^{30} + x^{29}\\
&+ x^{26} + x^{24} + x^{23} + x^{22} + x^{21} + x^{20} + x^{18} + x^{15} + x^{14} + x^{13} + x^{10}\\
&+ x^{9},\\
p_{12}(x) = {}& x^{156} + x^{140} + x^{136} + x^{128} + x^{120} + x^{112} + x^{76} + x^{60} + x^{56} + x^{48}\\
&+ x^{44} + x^{40} + x^{32} + x^{28} + x^{24} + x^{16} + x^{8} + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) = {}& x^{147} + x^{146} + x^{145} + x^{143} + x^{142} + x^{140} + x^{138} + x^{136} + x^{135} + x^{132}\\
&+ x^{129} + x^{127} + x^{126} + x^{125} + x^{123} + x^{122} + x^{121} + x^{120} + x^{119}\\
&+ x^{115} + x^{112} + x^{111} + x^{110} + x^{109} + x^{107} + x^{106} + x^{105} + x^{103}\\
&+ x^{99} + x^{98} + x^{97} + x^{96} + x^{93} + x^{91} + x^{90} + x^{88} + x^{87} + x^{86} + x^{85}\\
&+ x^{84} + x^{83} + x^{81} + x^{80} + x^{78} + x^{76} + x^{75} + x^{74} + x^{73} + x^{72} + x^{68}\\
&+ x^{67} + x^{60} + x^{54} + x^{52} + x^{48} + x^{47} + x^{45} + x^{44} + x^{42},\\
p_3(x) = {}& x^{143} + x^{142} + x^{141} + x^{139} + x^{138} + x^{136} + x^{134} + x^{132} + x^{129} + x^{127}\\
&+ x^{126} + x^{125} + x^{124} + x^{123} + x^{122} + x^{121} + x^{120} + x^{119} + x^{117}\\
&+ x^{114} + x^{113} + x^{108} + x^{107} + x^{106} + x^{104} + x^{101} + x^{100} + x^{98} + x^{96}\\
&+ x^{94} + x^{92} + x^{91} + x^{87} + x^{86} + x^{85} + x^{82} + x^{81} + x^{79} + x^{78} + x^{77}\\
&+ x^{76} + x^{74} + x^{71} + x^{70} + x^{69} + x^{65} + x^{62} + x^{61} + x^{60} + x^{59} + x^{58}\\
&+ x^{57} + x^{52} + x^{50} + x^{49} + x^{48} + x^{45} + x^{43} + x^{42} + x^{35} + x^{33} + x^{31}
\end{aligned}
$$

$$
\begin{aligned}
&+ x^{30} + x^{29} + x^{28} + x^{26},\\
p_6(x) &= x^{145} + x^{144} + x^{143} + x^{142} + x^{140} + x^{138} + x^{137} + x^{135} + x^{134} + x^{131}\\
&+ x^{128} + x^{127} + x^{125} + x^{124} + x^{121} + x^{117} + x^{114} + x^{113} + x^{112}\\
&+ x^{110} + x^{109} + x^{108} + x^{107} + x^{105} + x^{104} + x^{103} + x^{102} + x^{100}\\
&+ x^{94} + x^{92} + x^{91} + x^{84} + x^{83} + x^{81} + x^{79} + x^{77} + x^{76} + x^{75} + x^{71}\\
&+ x^{66} + x^{65} + x^{64} + x^{63} + x^{62} + x^{61} + x^{60} + x^{59} + x^{58} + x^{55} + x^{54}\\
&+ x^{53} + x^{51} + x^{49} + x^{46} + x^{45} + x^{44} + x^{43} + x^{39} + x^{38} + x^{34} + x^{29}\\
&+ x^{28} + x^{25} + x^{24} + x^{23} + x^{19} + x^{17} + x^{16} + x^{14} + x^{11} + x^{10} + x^{8}\\
&+ x^{7} + x^{6} + x^{4} + x^{3} + x^{2} + 1,\\
p_9(x) &= x^{143} + x^{142} + x^{140} + x^{139} + x^{138} + x^{136} + x^{135} + x^{134} + x^{132} + x^{127}\\
&+ x^{126} + x^{124} + x^{63} + x^{62} + x^{60} + x^{59} + x^{58} + x^{56} + x^{55} + x^{54} + x^{52}\\
&+ x^{47} + x^{46} + x^{44} + x^{31} + x^{30} + x^{28} + x^{27} + x^{26} + x^{24} + x^{23} + x^{22}\\
&+ x^{20} + x^{15} + x^{14} + x^{12},\\
p_{12}(x) &= x^{147} + x^{146} + x^{144} + x^{143} + x^{142} + x^{140} + x^{127} + x^{126} + x^{124} + x^{123}\\
&+ x^{122} + x^{120} + x^{119} + x^{118} + x^{116} + x^{115} + x^{114} + x^{112} + x^{67} + x^{66}\\
&+ x^{64} + x^{63} + x^{62} + x^{60} + x^{47} + x^{46} + x^{44} + x^{43} + x^{42} + x^{40} + x^{39}\\
&+ x^{38} + x^{36} + x^{31} + x^{30} + x^{28} + x^{15} + x^{14} + x^{12} + x^{11} + x^{10} + x^{8}\\
&+ x^{7} + x^{6} + x^{4} + x^{3} + x^{2} + 1,
\end{aligned}
$$

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

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

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

n	$\Lambda(n)$	n	$\Lambda(n)$	n	$\Lambda(n)$	n	$\Lambda(n)$
0	[1, 2]	769	[1022, 1164]	1538	[2169, 2170]	2307	[1575, 2713]
1	[3, 4]	770	[1056, 1290]	1539	[899, 2171]	2308	[2750, 648]
2	[5, 6]	771	[1041, 1291]	1540	[2067, 2172]	2309	[1800, 1694]
3	[7, 8]	772	[1292, 1293]	1541	[952, 2173]	2310	[1889, 2751]
4	[9, 10]	773	[1294, 845]	1542	[2075, 1991]	2311	[596, 2735]
5	[11, 12]	774	[1295, 1296]	1543	[2149, 1992]	2312	[2752, 1793]
6	[13, 14]	775	[1297, 936]	1544	[387, 887]	2313	[131, 824]
7	[15, 16]	776	[999, 922]	1545	[2174, 99]	2314	[2753, 2754]
8	[17, 18]	777	[969, 1267]	1546	[454, 2175]	2315	[1891, 1393]
9	[19, 20]	778	[1176, 1222]	1547	[2097, 331]	2316	[2755, 186]
10	[21, 22]	779	[28, 956]	1548	[1017, 2176]	2317	[2756, 1547]
11	[23, 24]	780	[926, 1298]	1549	[2177, 2114]	2318	[226, 211]
12	[25, 26]	781	[973, 437]	1550	[2178, 412]	2319	[2757, 2751]
13	[27, 28]	782	[1299, 1300]	1551	[2179, 2180]	2320	[1404, 2758]
14	[29, 30]	783	[1301, 1302]	1552	[1107, 2181]	2321	[1522, 463]
15	[31, 32]	784	[1194, 1182]	1553	[2182, 2183]	2322	[2738, 1720]

16	[33, 34]	785	[1303, 1304]	1554	[2184, 2086]	2323	[171, 1782]
17	[35, 36]	786	[1305, 1306]	1555	[2185, 2186]	2324	[2759, 606]
18	[37, 38]	787	[1307, 1308]	1556	[2059, 2187]	2325	[571, 626]
19	[39, 40]	788	[1309, 1023]	1557	[2188, 2189]	2326	[2760, 2761]
20	[41, 42]	789	[1310, 1308]	1558	[1155, 2190]	2327	[1660, 1944]
21	[43, 44]	790	[1311, 1312]	1559	[437, 1105]	2328	[510, 1869]
22	[45, 46]	791	[1313, 420]	1560	[1013, 368]	2329	[482, 561]
23	[47, 48]	792	[1314, 1315]	1561	[1254, 2191]	2330	[2762, 1858]
24	[49, 50]	793	[1316, 1317]	1562	[365, 1049]	2331	[2763, 2764]
25	[51, 52]	794	[1318, 1319]	1563	[2192, 2193]	2332	[2765, 2766]
26	[53, 54]	795	[1320, 344]	1564	[2194, 2195]	2333	[755, 2723]
27	[55, 56]	796	[1321, 1322]	1565	[1169, 2196]	2334	[2605, 2711]
28	[57, 58]	797	[1323, 1324]	1566	[2111, 1364]	2335	[2618, 481]
29	[59, 60]	798	[1058, 1152]	1567	[299, 936]	2336	[2767, 1545]
30	[61, 62]	799	[1325, 1326]	1568	[1100, 2197]	2337	[1932, 2768]
31	[63, 64]	800	[1327, 1026]	1569	[1234, 2198]	2338	[2769, 1434]
32	[65, 66]	801	[414, 1328]	1570	[1033, 1082]	2339	[1564, 206]
33	[67, 68]	802	[1329, 1330]	1571	[1119, 2199]	2340	[2765, 2683]
34	[69, 70]	803	[1072, 249]	1572	[945, 2200]	2341	[2770, 2771]
35	[71, 72]	804	[1331, 1332]	1573	[2038, 2201]	2342	[1713, 232]
36	[73, 74]	805	[1333, 1334]	1574	[1105, 2202]	2343	[641, 2573]
37	[75, 76]	806	[1335, 878]	1575	[2010, 2203]	2344	[1388, 1982]
38	[77, 78]	807	[1336, 1337]	1576	[1256, 1083]	2345	[1900, 1827]
39	[79, 80]	808	[1338, 1339]	1577	[905, 2146]	2346	[2772, 2773]
40	[81, 82]	809	[1156, 1340]	1578	[2204, 2205]	2347	[2774, 2629]
41	[83, 84]	810	[1341, 1342]	1579	[2189, 963]	2348	[1888, 2775]
42	[85, 86]	811	[1343, 307]	1580	[2052, 2206]	2349	[2776, 1819]
43	[87, 88]	812	[1344, 978]	1581	[2207, 2208]	2350	[1686, 2777]
44	[89, 90]	813	[1253, 1345]	1582	[443, 2209]	2351	[1781, 490]
45	[22, 91]	814	[450, 424]	1583	[1060, 2210]	2352	[2778, 2697]
46	[92, 93]	815	[1346, 1091]	1584	[1338, 1287]	2353	[2779, 622]
47	[94, 95]	816	[1283, 892]	1585	[2211, 2212]	2354	[58, 493]
48	[96, 97]	817	[861, 1347]	1586	[2213, 2151]	2355	[1423, 1408]
49	[98, 99]	818	[1348, 291]	1587	[2214, 2215]	2356	[1377, 2780]
50	[100, 101]	819	[1349, 1350]	1588	[455, 1122]	2357	[1637, 2781]
51	[102, 103]	820	[965, 1351]	1589	[2216, 2217]	2358	[1459, 651]
52	[104, 105]	821	[1352, 1353]	1590	[2218, 1251]	2359	[1708, 1643]
53	[106, 107]	822	[458, 1354]	1591	[1133, 2219]	2360	[1700, 1481]
54	[108, 109]	823	[1355, 1356]	1592	[64, 2220]	2361	[1814, 1647]
55	[110, 111]	824	[1357, 1358]	1593	[2221, 2157]	2362	[1546, 2782]
56	[112, 113]	825	[1359, 1114]	1594	[2016, 1027]	2363	[2783, 1485]
57	[114, 115]	826	[947, 1360]	1595	[1040, 2222]	2364	[2784, 2584]
58	[116, 117]	827	[356, 1361]	1596	[1161, 2223]	2365	[1507, 2623]
59	[118, 119]	828	[1362, 1363]	1597	[2224, 1214]	2366	[1638, 607]

60	[120, 121]	829	[903, 1364]	1598	[849, 2225]	2367	[2785, 1789]
61	[122, 123]	830	[1365, 1366]	1599	[1321, 289]	2368	[1629, 577]
62	[124, 125]	831	[1013, 1367]	1600	[869, 80]	2369	[1646, 1760]
63	[126, 127]	832	[1071, 1368]	1601	[2226, 1171]	2370	[2626, 1961]
64	[128, 129]	833	[16, 1369]	1602	[2227, 2228]	2371	[1657, 1749]
65	[130, 131]	834	[1370, 137]	1603	[2101, 2169]	2372	[692, 2786]
66	[132, 133]	835	[665, 1371]	1604	[2229, 2230]	2373	[529, 2787]
67	[134, 135]	836	[1372, 1373]	1605	[2231, 2232]	2374	[1950, 173]
68	[136, 137]	837	[1374, 1375]	1606	[2233, 2234]	2375	[2788, 586]
69	[138, 139]	838	[1376, 667]	1607	[2235, 2236]	2376	[2789, 1782]
70	[140, 141]	839	[1377, 1378]	1608	[2237, 1029]	2377	[1452, 506]
71	[142, 143]	840	[1379, 1380]	1609	[2238, 294]	2378	[1669, 2623]
72	[144, 145]	841	[1381, 1382]	1610	[2183, 968]	2379	[2790, 1626]
73	[146, 147]	842	[475, 558]	1611	[2239, 2240]	2380	[1969, 2639]
74	[148, 149]	843	[1383, 1384]	1612	[2241, 264]	2381	[526, 2773]
75	[150, 151]	844	[741, 1385]	1613	[1179, 2242]	2382	[2791, 2792]
76	[152, 153]	845	[1386, 470]	1614	[843, 2243]	2383	[563, 657]
77	[154, 155]	846	[1387, 1388]	1615	[382, 2140]	2384	[242, 1488]
78	[136, 156]	847	[1389, 745]	1616	[2244, 1011]	2385	[1723, 2793]
79	[157, 158]	848	[1390, 1391]	1617	[2245, 2246]	2386	[157, 2647]
80	[159, 160]	849	[206, 1392]	1618	[1214, 108]	2387	[2615, 1603]
81	[161, 162]	850	[141, 1393]	1619	[2247, 1261]	2388	[1689, 2771]
82	[163, 164]	851	[1394, 540]	1620	[2248, 1221]	2389	[1476, 241]
83	[165, 166]	852	[1395, 1396]	1621	[2249, 2250]	2390	[2794, 2795]
84	[167, 168]	853	[1397, 1398]	1622	[2251, 2252]	2391	[1696, 1842]
85	[169, 170]	854	[1399, 662]	1623	[2253, 2254]	2392	[1550, 2583]
86	[171, 172]	855	[771, 663]	1624	[2255, 2256]	2393	[2796, 638]
87	[173, 174]	856	[196, 1400]	1625	[2257, 2054]	2394	[2797, 2798]
88	[175, 176]	857	[1401, 1402]	1626	[2055, 2258]	2395	[672, 2779]
89	[177, 178]	858	[1403, 1404]	1627	[877, 2259]	2396	[1739, 2799]
90	[179, 180]	859	[498, 1405]	1628	[2003, 2260]	2397	[2800, 670]
91	[181, 182]	860	[1406, 1407]	1629	[2122, 2261]	2398	[1985, 2705]
92	[183, 184]	861	[1408, 1409]	1630	[1331, 20]	2399	[715, 2801]
93	[185, 186]	862	[1410, 1411]	1631	[2262, 963]	2400	[2802, 661]
94	[187, 8]	863	[508, 1412]	1632	[1251, 2263]	2401	[2803, 2589]
95	[188, 189]	864	[1413, 1414]	1633	[2264, 2265]	2402	[682, 34]
96	[190, 11]	865	[1415, 1416]	1634	[2194, 2266]	2403	[1472, 620]
97	[191, 192]	866	[160, 1417]	1635	[2267, 2268]	2404	[696, 1811]
98	[193, 194]	867	[806, 1418]	1636	[1356, 1013]	2405	[2633, 2646]
99	[195, 196]	868	[1419, 159]	1637	[1045, 2269]	2406	[505, 1497]
100	[197, 198]	869	[1420, 1421]	1638	[1280, 2270]	2407	[1811, 2804]
101	[199, 200]	870	[8, 1422]	1639	[109, 1213]	2408	[2805, 1598]
102	[201, 202]	871	[1423, 1424]	1640	[2271, 2272]	2409	[2575, 1506]
103	[203, 204]	872	[1425, 59]	1641	[1094, 871]	2410	[608, 2806]

104	[205, 206]	873	[644, 1426]	1642	[2269, 1258]	2411	[1557, 2598]
105	[207, 208]	874	[1427, 1428]	1643	[2273, 2128]	2412	[48, 483]
106	[209, 210]	875	[1429, 1430]	1644	[909, 2184]	2413	[1770, 2807]
107	[211, 212]	876	[1431, 1432]	1645	[2274, 2275]	2414	[2609, 2808]
108	[213, 214]	877	[1433, 196]	1646	[254, 1019]	2415	[2809, 1725]
109	[32, 215]	878	[760, 1434]	1647	[258, 2276]	2416	[2740, 2716]
110	[216, 217]	879	[1435, 33]	1648	[2277, 1054]	2417	[794, 2810]
111	[218, 219]	880	[1436, 1437]	1649	[293, 970]	2418	[2547, 2699]
112	[220, 221]	881	[1438, 1374]	1650	[1096, 1134]	2419	[1481, 518]
113	[61, 222]	882	[1439, 1440]	1651	[1243, 2050]	2420	[1753, 2761]
114	[223, 224]	883	[158, 1441]	1652	[948, 2278]	2421	[1578, 2811]
115	[225, 226]	884	[1442, 1443]	1653	[2279, 2280]	2422	[640, 2812]
116	[227, 228]	885	[204, 1444]	1654	[265, 2281]	2423	[1936, 2557]
117	[229, 230]	886	[1445, 1446]	1655	[30, 315]	2424	[1675, 2797]
118	[58, 231]	887	[224, 1447]	1656	[1171, 2282]	2425	[1983, 2593]
119	[232, 233]	888	[1448, 1449]	1657	[2283, 1226]	2426	[2813, 675]
120	[234, 235]	889	[1437, 797]	1658	[2284, 2188]	2427	[707, 2814]
121	[48, 236]	890	[1450, 783]	1659	[2285, 2286]	2428	[480, 547]
122	[237, 238]	891	[1451, 619]	1660	[2189, 1245]	2429	[32, 1592]
123	[239, 240]	892	[591, 1452]	1661	[2287, 2288]	2430	[704, 570]
124	[241, 242]	893	[819, 1453]	1662	[986, 2289]	2431	[649, 1957]
125	[243, 244]	894	[1454, 1455]	1663	[2290, 1188]	2432	[198, 1964]
126	[245, 246]	895	[1453, 1456]	1664	[1071, 2268]	2433	[805, 1583]
127	[247, 248]	896	[178, 640]	1665	[2291, 2292]	2434	[2692, 2815]
128	[249, 250]	897	[1457, 1458]	1666	[335, 1001]	2435	[1743, 2816]
129	[251, 252]	898	[1459, 1460]	1667	[2293, 2294]	2436	[1616, 2817]
130	[253, 254]	899	[1461, 1462]	1668	[333, 1366]	2437	[1804, 228]
131	[255, 256]	900	[1463, 1464]	1669	[1992, 2295]	2438	[2745, 566]
132	[257, 258]	901	[1465, 1466]	1670	[1305, 2296]	2439	[2818, 2768]
133	[259, 260]	902	[1467, 1468]	1671	[417, 2297]	2440	[2819, 639]
134	[261, 262]	903	[1405, 1469]	1672	[284, 2298]	2441	[470, 611]
135	[263, 264]	904	[1470, 1471]	1673	[1022, 2299]	2442	[1561, 159]
136	[265, 266]	905	[1451, 1472]	1674	[2300, 2301]	2443	[2820, 2817]
137	[267, 268]	906	[668, 1449]	1675	[2302, 2303]	2444	[1512, 792]
138	[269, 270]	907	[1473, 694]	1676	[458, 2304]	2445	[1944, 2821]
139	[271, 272]	908	[1474, 1475]	1677	[2305, 2306]	2446	[1456, 2822]
140	[120, 273]	909	[1476, 1477]	1678	[351, 1076]	2447	[1641, 483]
141	[274, 275]	910	[1478, 1479]	1679	[2307, 962]	2448	[1741, 478]
142	[276, 277]	911	[1480, 1481]	1680	[944, 1044]	2449	[1970, 709]
143	[278, 279]	912	[206, 37]	1681	[2308, 2051]	2450	[1589, 1685]
144	[280, 281]	913	[1482, 1483]	1682	[452, 892]	2451	[1439, 1680]
145	[282, 283]	914	[1484, 1485]	1683	[2309, 2310]	2452	[2763, 2823]
146	[284, 285]	915	[1486, 1487]	1684	[2096, 2311]	2453	[2824, 2662]
147	[286, 287]	916	[1488, 1489]	1685	[2312, 2313]	2454	[2825, 2692]

148	[288, 289]	917	[1490, 1491]	1686	[2314, 2315]	2455	[1688, 541]
149	[290, 291]	918	[1492, 1493]	1687	[1197, 1361]	2456	[179, 2638]
150	[292, 293]	919	[1429, 1494]	1688	[2316, 2207]	2457	[2595, 2826]
151	[294, 295]	920	[1495, 1496]	1689	[438, 1106]	2458	[1855, 1823]
152	[296, 92]	921	[1497, 1498]	1690	[2317, 973]	2459	[2707, 2604]
153	[297, 298]	922	[1499, 1500]	1691	[370, 1285]	2460	[2827, 1821]
154	[299, 300]	923	[1501, 207]	1692	[1122, 2253]	2461	[2828, 2571]
155	[301, 302]	924	[1502, 1503]	1693	[379, 2318]	2462	[598, 2829]
156	[303, 304]	925	[1412, 1504]	1694	[2319, 2320]	2463	[1539, 146]
157	[117, 81]	926	[1505, 1506]	1695	[336, 2321]	2464	[2830, 1594]
158	[305, 306]	927	[1373, 1507]	1696	[2322, 356]	2465	[230, 1898]
159	[307, 308]	928	[646, 1508]	1697	[429, 2323]	2466	[2831, 1591]
160	[309, 310]	929	[1509, 1510]	1698	[2324, 2325]	2467	[1515, 710]
161	[311, 312]	930	[1511, 1512]	1699	[2326, 6]	2468	[1407, 1429]
162	[313, 314]	931	[1513, 1514]	1700	[2327, 2233]	2469	[575, 1400]
163	[315, 316]	932	[1515, 1516]	1701	[24, 2328]	2470	[1954, 1430]
164	[317, 318]	933	[1517, 1518]	1702	[2098, 2024]	2471	[2832, 1953]
165	[319, 320]	934	[570, 1519]	1703	[2329, 1001]	2472	[1647, 2693]
166	[321, 322]	935	[1520, 1521]	1704	[2330, 2331]	2473	[611, 1448]
167	[323, 324]	936	[1522, 1523]	1705	[2332, 2333]	2474	[2720, 1638]
168	[325, 326]	937	[1524, 1525]	1706	[86, 2166]	2475	[2833, 2555]
169	[327, 328]	938	[463, 1526]	1707	[1328, 341]	2476	[2779, 2834]
170	[329, 330]	939	[1527, 1528]	1708	[2334, 2335]	2477	[779, 1864]
171	[331, 332]	940	[1529, 808]	1709	[2336, 853]	2478	[2835, 529]
172	[333, 334]	941	[1530, 1531]	1710	[2274, 2286]	2479	[545, 558]
173	[335, 336]	942	[1532, 1533]	1711	[2001, 25]	2480	[1849, 1974]
174	[337, 338]	943	[1534, 1535]	1712	[2249, 2337]	2481	[683, 498]
175	[339, 340]	944	[1536, 1537]	1713	[2054, 443]	2482	[199, 800]
176	[341, 342]	945	[1538, 1461]	1714	[2338, 2339]	2483	[2836, 2647]
177	[343, 344]	946	[536, 736]	1715	[67, 2340]	2484	[130, 823]
178	[345, 346]	947	[531, 534]	1716	[2341, 1005]	2485	[1385, 1919]
179	[347, 348]	948	[537, 1539]	1717	[2342, 118]	2486	[1709, 2837]
180	[325, 313]	949	[1537, 1540]	1718	[303, 2343]	2487	[2838, 2839]
181	[349, 350]	950	[1537, 530]	1719	[2344, 2345]	2488	[1375, 476]
182	[351, 352]	951	[533, 536]	1720	[2346, 1147]	2489	[1913, 2840]
183	[353, 354]	952	[1539, 1541]	1721	[2347, 1228]	2490	[2587, 2839]
184	[355, 356]	953	[1542, 1543]	1722	[1299, 2348]	2491	[2841, 2797]
185	[357, 358]	954	[1544, 1545]	1723	[2349, 2350]	2492	[785, 2566]
186	[359, 360]	955	[1546, 1547]	1724	[1164, 975]	2493	[2842, 602]
187	[361, 362]	956	[1530, 1548]	1725	[2300, 2351]	2494	[777, 2843]
188	[363, 364]	957	[1549, 1550]	1726	[319, 378]	2495	[471, 668]
189	[365, 366]	958	[1551, 1552]	1727	[2352, 2188]	2496	[1812, 2822]
190	[367, 368]	959	[678, 655]	1728	[2193, 77]	2497	[2844, 205]
191	[369, 370]	960	[731, 1553]	1729	[1287, 2353]	2498	[828, 1965]

192	[371, 372]	961	[1554, 1555]	1730	[406, 2354]	2499	[1374, 213]
193	[373, 374]	962	[1490, 1556]	1731	[1123, 2355]	2500	[2845, 583]
194	[375, 376]	963	[1557, 726]	1732	[2199, 2356]	2501	[1563, 205]
195	[377, 378]	964	[522, 746]	1733	[1173, 2165]	2502	[1694, 2688]
196	[115, 379]	965	[667, 1558]	1734	[2308, 347]	2503	[2813, 1966]
197	[380, 381]	966	[1390, 557]	1735	[2357, 2262]	2504	[2564, 1536]
198	[382, 383]	967	[1412, 1458]	1736	[981, 2358]	2505	[1848, 1422]
199	[275, 384]	968	[137, 1559]	1737	[2326, 1176]	2506	[569, 592]
200	[286, 385]	969	[790, 1560]	1738	[1129, 332]	2507	[781, 137]
201	[386, 387]	970	[1561, 1562]	1739	[2182, 435]	2508	[1843, 2681]
202	[388, 122]	971	[830, 1383]	1740	[2359, 927]	2509	[728, 2642]
203	[389, 390]	972	[1469, 792]	1741	[989, 2360]	2510	[591, 154]
204	[391, 392]	973	[1563, 1564]	1742	[281, 2125]	2511	[1944, 734]
205	[393, 394]	974	[215, 569]	1743	[2165, 1025]	2512	[147, 1395]
206	[395, 396]	975	[540, 1565]	1744	[25, 433]	2513	[1536, 1462]
207	[397, 398]	976	[1566, 1567]	1745	[2361, 2362]	2514	[2846, 192]
208	[116, 399]	977	[1568, 1569]	1746	[2363, 863]	2515	[552, 2562]
209	[400, 401]	978	[1484, 1570]	1747	[247, 96]	2516	[750, 2847]
210	[402, 403]	979	[797, 1571]	1748	[2364, 1182]	2517	[2581, 183]
211	[89, 404]	980	[1470, 1572]	1749	[1001, 2321]	2518	[1622, 169]
212	[405, 406]	981	[1573, 1574]	1750	[2365, 2366]	2519	[2848, 1524]
213	[407, 408]	982	[570, 593]	1751	[2367, 2368]	2520	[1703, 2745]
214	[409, 410]	983	[557, 1575]	1752	[2369, 1199]	2521	[1915, 1674]
215	[85, 411]	984	[1576, 1577]	1753	[2370, 2371]	2522	[2804, 2777]
216	[412, 413]	985	[1578, 521]	1754	[860, 884]	2523	[2849, 1744]
217	[414, 415]	986	[726, 1579]	1755	[2372, 2373]	2524	[1750, 239]
218	[416, 417]	987	[1382, 1580]	1756	[1258, 2374]	2525	[2850, 145]
219	[418, 419]	988	[1581, 1582]	1757	[2375, 313]	2526	[748, 1571]
220	[420, 421]	989	[1583, 197]	1758	[2376, 427]	2527	[1623, 2758]
221	[324, 422]	990	[1383, 1584]	1759	[1245, 2287]	2528	[1624, 2851]
222	[423, 424]	991	[1585, 1586]	1760	[2377, 2378]	2529	[2598, 727]
223	[425, 426]	992	[1571, 194]	1761	[979, 1100]	2530	[1774, 700]
224	[427, 428]	993	[1587, 1588]	1762	[2379, 1026]	2531	[703, 1457]
225	[417, 89]	994	[762, 1589]	1763	[2084, 2082]	2532	[1474, 2754]
226	[429, 430]	995	[509, 212]	1764	[2380, 2381]	2533	[577, 555]
227	[431, 432]	996	[1590, 1591]	1765	[2139, 2382]	2534	[2852, 2837]
228	[433, 434]	997	[1592, 704]	1766	[1315, 1101]	2535	[692, 2853]
229	[435, 436]	998	[1593, 1594]	1767	[1097, 2383]	2536	[2854, 2627]
230	[437, 438]	999	[1595, 1596]	1768	[2264, 2264]	2537	[649, 2855]
231	[439, 440]	1000	[1597, 1598]	1769	[1079, 1138]	2538	[528, 165]
232	[441, 442]	1001	[755, 1599]	1770	[2245, 2384]	2539	[2661, 1609]
233	[443, 417]	1002	[561, 1600]	1771	[2385, 2386]	2540	[1906, 2729]
234	[444, 445]	1003	[1601, 1602]	1772	[2387, 2388]	2541	[2856, 1355]
235	[404, 446]	1004	[1603, 1604]	1773	[1332, 2094]	2542	[2199, 2857]

236	[447, 448]	1005	[1605, 1606]	1774	[2144, 2389]	2543	[2394, 1338]
237	[449, 450]	1006	[1607, 546]	1775	[1158, 106]	2544	[123, 1064]
238	[451, 118]	1007	[1438, 1417]	1776	[2390, 1053]	2545	[2408, 2858]
239	[316, 452]	1008	[170, 1497]	1777	[1362, 2391]	2546	[942, 2061]
240	[453, 454]	1009	[586, 1608]	1778	[2392, 1257]	2547	[2859, 953]
241	[455, 456]	1010	[1609, 1610]	1779	[2305, 2232]	2548	[1352, 2310]
242	[457, 458]	1011	[181, 1611]	1780	[2393, 909]	2549	[125, 2246]
243	[459, 460]	1012	[773, 679]	1781	[1260, 2054]	2550	[278, 2860]
244	[399, 461]	1013	[1612, 1613]	1782	[2394, 2395]	2551	[2861, 2184]
245	[462, 463]	1014	[1614, 1615]	1783	[1282, 2396]	2552	[395, 2862]
246	[464, 465]	1015	[1616, 1617]	1784	[1285, 2194]	2553	[2863, 1310]
247	[466, 467]	1016	[177, 639]	1785	[1237, 1088]	2554	[1123, 2175]
248	[468, 469]	1017	[1598, 1618]	1786	[2397, 2117]	2555	[869, 1249]
249	[470, 471]	1018	[12, 690]	1787	[1143, 2398]	2556	[350, 2864]
250	[472, 473]	1019	[478, 1435]	1788	[2367, 2399]	2557	[2485, 2865]
251	[474, 475]	1020	[612, 502]	1789	[2400, 2096]	2558	[2866, 2399]
252	[213, 476]	1021	[1619, 1437]	1790	[2401, 2402]	2559	[2401, 72]
253	[477, 478]	1022	[1620, 1621]	1791	[2403, 2404]	2560	[911, 2043]
254	[479, 480]	1023	[1622, 504]	1792	[1361, 405]	2561	[2867, 347]
255	[481, 482]	1024	[555, 768]	1793	[1023, 2405]	2562	[894, 2868]
256	[483, 484]	1025	[1403, 1623]	1794	[2278, 1318]	2563	[398, 2052]
257	[485, 486]	1026	[1624, 1625]	1795	[101, 864]	2564	[1004, 2091]
258	[487, 488]	1027	[1542, 1626]	1796	[2406, 322]	2565	[1304, 2869]
259	[489, 490]	1028	[1627, 1456]	1797	[1082, 301]	2566	[2870, 2362]
260	[491, 44]	1029	[1628, 809]	1798	[413, 2332]	2567	[363, 2871]
261	[492, 493]	1030	[1629, 554]	1799	[2407, 2343]	2568	[2872, 2873]
262	[494, 495]	1031	[45, 1630]	1800	[2408, 2409]	2569	[1146, 1237]
263	[496, 241]	1032	[1631, 1632]	1801	[341, 2410]	2570	[1199, 2874]
264	[239, 134]	1033	[1633, 1634]	1802	[1207, 2411]	2571	[2312, 2371]
265	[497, 498]	1034	[1635, 1636]	1803	[2373, 2412]	2572	[1148, 1236]
266	[499, 500]	1035	[1467, 1637]	1804	[2413, 2414]	2573	[2497, 2212]
267	[501, 502]	1036	[1638, 1639]	1805	[2415, 2280]	2574	[2461, 2875]
268	[211, 503]	1037	[1640, 1641]	1806	[2416, 2417]	2575	[2876, 2111]
269	[504, 505]	1038	[1642, 128]	1807	[2020, 1113]	2576	[1006, 2877]
270	[154, 506]	1039	[1643, 1644]	1808	[1989, 2418]	2577	[2878, 2875]
271	[507, 508]	1040	[555, 1645]	1809	[2239, 2394]	2578	[2116, 2879]
272	[226, 509]	1041	[131, 1646]	1810	[2419, 2257]	2579	[393, 913]
273	[510, 511]	1042	[133, 1647]	1811	[1275, 2420]	2580	[2074, 1990]
274	[512, 513]	1043	[1648, 1649]	1812	[2356, 1136]	2581	[433, 2880]
275	[514, 515]	1044	[1650, 1651]	1813	[2104, 2413]	2582	[1290, 2206]
276	[516, 517]	1045	[1593, 1652]	1814	[324, 2421]	2583	[2114, 2222]
277	[518, 519]	1046	[1653, 1654]	1815	[2299, 975]	2584	[118, 2334]
278	[520, 521]	1047	[1655, 1656]	1816	[2026, 981]	2585	[1144, 2881]
279	[522, 129]	1048	[1657, 1658]	1817	[2317, 2422]	2586	[2857, 1264]

280	[163, 523]	1049	[1659, 1660]	1818	[2423, 1052]	2587	[318, 2864]
281	[524, 525]	1050	[1661, 1662]	1819	[1231, 2157]	2588	[2349, 1116]
282	[526, 527]	1051	[1663, 1664]	1820	[1165, 976]	2589	[1990, 2882]
283	[528, 529]	1052	[1665, 1666]	1821	[281, 2424]	2590	[78, 2333]
284	[530, 531]	1053	[57, 492]	1822	[2403, 2256]	2591	[26, 434]
285	[532, 533]	1054	[1667, 1668]	1823	[317, 350]	2592	[973, 2426]
286	[534, 535]	1055	[1669, 1670]	1824	[1289, 2034]	2593	[21, 1155]
287	[536, 537]	1056	[219, 1671]	1825	[1138, 2030]	2594	[2883, 2459]
288	[538, 539]	1057	[1513, 1672]	1826	[2425, 459]	2595	[2884, 2885]
289	[540, 541]	1058	[1673, 1674]	1827	[2185, 2019]	2596	[1242, 422]
290	[542, 543]	1059	[1675, 1676]	1828	[404, 2112]	2597	[255, 2886]
291	[544, 545]	1060	[1677, 832]	1829	[105, 915]	2598	[2887, 2372]
292	[546, 547]	1061	[1556, 1678]	1830	[1079, 2243]	2599	[2263, 2888]
293	[548, 549]	1062	[1679, 1680]	1831	[2422, 2426]	2600	[2113, 861]
294	[550, 551]	1063	[1681, 709]	1832	[2168, 2427]	2601	[2213, 2889]
295	[552, 553]	1064	[1373, 1669]	1833	[1019, 2428]	2602	[2010, 2252]
296	[554, 555]	1065	[240, 1682]	1834	[16, 2429]	2603	[2890, 2250]
297	[556, 557]	1066	[1683, 1684]	1835	[2430, 981]	2604	[2183, 436]
298	[558, 139]	1067	[740, 1685]	1836	[2284, 2357]	2605	[2891, 2892]
299	[559, 560]	1068	[1686, 1687]	1837	[2174, 2431]	2606	[1077, 1101]
300	[561, 562]	1069	[1394, 1688]	1838	[2432, 2433]	2607	[360, 1268]
301	[563, 564]	1070	[1689, 1690]	1839	[2434, 2435]	2608	[1356, 367]
302	[565, 566]	1071	[605, 1691]	1840	[2002, 433]	2609	[1005, 2528]
303	[567, 568]	1072	[1692, 1403]	1841	[2280, 1276]	2610	[882, 258]
304	[569, 570]	1073	[576, 1693]	1842	[1361, 28]	2611	[2893, 1098]
305	[571, 572]	1074	[151, 1694]	1843	[2011, 2436]	2612	[1342, 1292]
306	[573, 574]	1075	[1695, 652]	1844	[1360, 1070]	2613	[1103, 971]
307	[575, 576]	1076	[204, 1552]	1845	[1341, 1126]	2614	[296, 2540]
308	[479, 546]	1077	[1696, 1697]	1846	[1152, 2437]	2615	[2387, 2894]
309	[577, 578]	1078	[1698, 1699]	1847	[2438, 85]	2616	[2046, 1360]
310	[59, 579]	1079	[1700, 1701]	1848	[2439, 890]	2617	[80, 1250]
311	[580, 581]	1080	[168, 221]	1849	[2440, 2441]	2618	[2506, 2501]
312	[582, 583]	1081	[594, 1702]	1850	[2039, 2442]	2619	[84, 423]
313	[584, 585]	1082	[1703, 565]	1851	[251, 401]	2620	[2027, 2358]
314	[586, 587]	1083	[1704, 1705]	1852	[851, 1164]	2621	[2895, 2896]
315	[588, 589]	1084	[1706, 1550]	1853	[2443, 2176]	2622	[873, 893]
316	[590, 591]	1085	[1707, 1708]	1854	[407, 1032]	2623	[2870, 2897]
317	[592, 593]	1086	[1709, 1710]	1855	[931, 2444]	2624	[1188, 861]
318	[594, 595]	1087	[574, 1711]	1856	[290, 2445]	2625	[1059, 2437]
319	[596, 597]	1088	[1712, 1713]	1857	[2446, 1162]	2626	[2332, 2898]
320	[598, 599]	1089	[664, 51]	1858	[2440, 2109]	2627	[2167, 1043]
321	[600, 601]	1090	[1714, 1528]	1859	[2447, 255]	2628	[2899, 2900]
322	[602, 603]	1091	[1612, 817]	1860	[930, 1196]	2629	[95, 2539]
323	[604, 463]	1092	[13, 1715]	1861	[2413, 2448]	2630	[348, 1046]

324	[191, 605]	1093	[1716, 539]	1862	[2449, 2258]	2631	[1273, 316]
325	[606, 607]	1094	[1717, 1425]	1863	[2450, 2451]	2632	[344, 2901]
326	[608, 609]	1095	[38, 500]	1864	[2113, 2452]	2633	[2902, 2283]
327	[610, 611]	1096	[719, 1718]	1865	[956, 2354]	2634	[857, 2903]
328	[612, 613]	1097	[1719, 1708]	1866	[2453, 889]	2635	[1155, 91]
329	[614, 615]	1098	[1704, 1720]	1867	[2454, 307]	2636	[2334, 2041]
330	[503, 616]	1099	[1721, 1567]	1868	[2455, 339]	2637	[2904, 1218]
331	[617, 618]	1100	[1722, 1723]	1869	[1066, 2456]	2638	[420, 2208]
332	[619, 620]	1101	[1628, 1724]	1870	[381, 305]	2639	[1169, 2905]
333	[621, 622]	1102	[190, 1725]	1871	[2032, 2457]	2640	[2398, 2881]
334	[623, 624]	1103	[547, 1726]	1872	[1210, 2345]	2641	[2906, 2517]
335	[625, 626]	1104	[1727, 652]	1873	[2458, 2301]	2642	[1064, 111]
336	[627, 628]	1105	[1564, 1728]	1874	[297, 2459]	2643	[2488, 2161]
337	[629, 630]	1106	[675, 1729]	1875	[2460, 2340]	2644	[397, 1056]
338	[631, 632]	1107	[1730, 1731]	1876	[2461, 2462]	2645	[1054, 2903]
339	[633, 634]	1108	[818, 1732]	1877	[1327, 2016]	2646	[271, 2283]
340	[151, 635]	1109	[1733, 1734]	1878	[852, 2463]	2647	[2907, 2538]
341	[636, 637]	1110	[1735, 1736]	1879	[2464, 1206]	2648	[1120, 2857]
342	[584, 638]	1111	[486, 1737]	1880	[81, 2465]	2649	[1056, 2052]
343	[639, 640]	1112	[1468, 1738]	1881	[2466, 2467]	2650	[1994, 2381]
344	[641, 642]	1113	[529, 166]	1882	[1030, 2162]	2651	[2908, 2530]
345	[643, 128]	1114	[144, 1739]	1883	[2468, 874]	2652	[1355, 1012]
346	[644, 645]	1115	[1392, 38]	1884	[932, 2469]	2653	[2477, 1145]
347	[646, 647]	1116	[1740, 1741]	1885	[2470, 331]	2654	[2909, 2521]
348	[648, 649]	1117	[145, 1742]	1886	[946, 1219]	2655	[2237, 2910]
349	[650, 651]	1118	[1743, 1744]	1887	[2471, 1329]	2656	[2297, 90]
350	[615, 152]	1119	[1745, 140]	1888	[887, 929]	2657	[2273, 1140]
351	[652, 632]	1120	[1746, 1747]	1889	[448, 2071]	2658	[2911, 2912]
352	[653, 524]	1121	[1748, 1749]	1890	[2466, 1326]	2659	[2913, 2048]
353	[172, 654]	1122	[1391, 514]	1891	[2362, 2472]	2660	[835, 2000]
354	[232, 655]	1123	[1750, 1751]	1892	[273, 2064]	2661	[1302, 2155]
355	[656, 657]	1124	[1752, 481]	1893	[2473, 2234]	2662	[2135, 2914]
356	[658, 127]	1125	[1753, 1754]	1894	[1323, 2474]	2663	[101, 2432]
357	[659, 660]	1126	[1755, 1756]	1895	[2475, 2476]	2664	[2915, 1340]
358	[661, 662]	1127	[1757, 161]	1896	[2346, 2477]	2665	[2253, 2261]
359	[50, 663]	1128	[1758, 1759]	1897	[124, 2245]	2666	[1137, 2916]
360	[664, 665]	1129	[1760, 1761]	1898	[436, 969]	2667	[2917, 1061]
361	[666, 667]	1130	[1762, 1763]	1899	[2478, 23]	2668	[1215, 427]
362	[668, 669]	1131	[1764, 1765]	1900	[2476, 2137]	2669	[307, 2918]
363	[670, 671]	1132	[1766, 1767]	1901	[65, 1047]	2670	[1989, 2484]
364	[672, 621]	1133	[545, 138]	1902	[391, 2479]	2671	[2400, 357]
365	[673, 674]	1134	[1482, 1768]	1903	[2480, 2481]	2672	[841, 2919]
366	[675, 676]	1135	[159, 1438]	1904	[272, 2482]	2673	[2920, 994]
367	[677, 678]	1136	[1769, 1770]	1905	[1197, 27]	2674	[1295, 1171]

368	[679, 680]	1137	[1436, 796]	1906	[2483, 2484]	2675	[447, 390]
369	[681, 682]	1138	[558, 1450]	1907	[1281, 2334]	2676	[2921, 2922]
370	[683, 684]	1139	[1771, 1772]	1908	[2485, 2486]	2677	[427, 2923]
371	[685, 681]	1140	[1773, 1774]	1909	[1309, 1009]	2678	[2924, 1990]
372	[472, 686]	1141	[1597, 1775]	1910	[305, 2272]	2679	[2925, 1120]
373	[687, 688]	1142	[1776, 1777]	1911	[111, 397]	2680	[2356, 1264]
374	[478, 681]	1143	[1778, 1531]	1912	[974, 2407]	2681	[2907, 95]
375	[689, 690]	1144	[679, 1779]	1913	[2487, 2388]	2682	[960, 2038]
376	[691, 692]	1145	[1707, 1780]	1914	[2439, 874]	2683	[964, 2288]
377	[661, 693]	1146	[1781, 1712]	1915	[2488, 2489]	2684	[1177, 2926]
378	[694, 695]	1147	[1782, 1783]	1916	[23, 2373]	2685	[329, 459]
379	[696, 697]	1148	[494, 1784]	1917	[2295, 1151]	2686	[2927, 883]
380	[698, 699]	1149	[1785, 1583]	1918	[2229, 2490]	2687	[2895, 457]
381	[700, 701]	1150	[1786, 1787]	1919	[881, 257]	2688	[295, 2201]
382	[702, 703]	1151	[1386, 610]	1920	[2491, 2239]	2689	[1036, 1132]
383	[215, 704]	1152	[523, 1788]	1921	[2238, 960]	2690	[1259, 2257]
384	[705, 706]	1153	[1581, 161]	1922	[2295, 2492]	2691	[1109, 1064]
385	[707, 708]	1154	[1789, 700]	1923	[2493, 2059]	2692	[1032, 1163]
386	[709, 710]	1155	[1477, 1790]	1924	[2022, 2494]	2693	[2421, 1071]
387	[711, 712]	1156	[1791, 1792]	1925	[2495, 905]	2694	[2187, 1123]
388	[713, 239]	1157	[1745, 1793]	1926	[2121, 2496]	2695	[2928, 1235]
389	[714, 715]	1158	[1792, 211]	1927	[2497, 2498]	2696	[2216, 2929]
390	[716, 658]	1159	[1569, 733]	1928	[2464, 2499]	2697	[2421, 2267]
391	[717, 718]	1160	[1794, 1795]	1929	[2500, 2396]	2698	[1044, 2200]
392	[719, 720]	1161	[1796, 1797]	1930	[2197, 2034]	2699	[456, 2253]
393	[721, 722]	1162	[790, 1711]	1931	[344, 2501]	2700	[102, 2476]
394	[723, 724]	1163	[1798, 1704]	1932	[2502, 2503]	2701	[1292, 1069]
395	[564, 725]	1164	[1437, 748]	1933	[2504, 1304]	2702	[2930, 2510]
396	[726, 727]	1165	[1799, 1800]	1934	[2505, 1009]	2703	[1175, 1273]
397	[728, 729]	1166	[1801, 1802]	1935	[2141, 2503]	2704	[2393, 2861]
398	[730, 731]	1167	[1803, 1664]	1936	[1320, 2506]	2705	[2348, 2931]
399	[624, 732]	1168	[730, 1524]	1937	[2507, 2183]	2706	[20, 2094]
400	[733, 734]	1169	[1804, 1805]	1938	[2508, 2411]	2707	[1345, 257]
401	[705, 735]	1170	[717, 784]	1939	[2193, 413]	2708	[2036, 2932]
402	[736, 737]	1171	[1806, 1807]	1940	[254, 2435]	2709	[2382, 86]
403	[738, 739]	1172	[229, 1808]	1941	[2377, 2509]	2710	[2083, 84]
404	[740, 741]	1173	[1556, 1809]	1942	[24, 2412]	2711	[2415, 1275]
405	[127, 742]	1174	[1810, 1811]	1943	[2110, 903]	2712	[1021, 851]
406	[691, 743]	1175	[1453, 1812]	1944	[2197, 2385]	2713	[2011, 2191]
407	[744, 745]	1176	[235, 1813]	1945	[276, 996]	2714	[1070, 385]
408	[746, 747]	1177	[1555, 1592]	1946	[924, 445]	2715	[1992, 1150]
409	[748, 193]	1178	[132, 1814]	1947	[2445, 917]	2716	[2450, 2120]
410	[749, 750]	1179	[1732, 1453]	1948	[345, 2510]	2717	[30, 1273]
411	[566, 751]	1180	[1180, 1180]	1949	[2233, 2511]	2718	[2188, 2262]

412	[752, 753]	1181	[1815, 1816]	1950	[988, 2196]	2719	[1039, 2114]
413	[754, 755]	1182	[133, 1817]	1951	[2504, 2512]	2720	[384, 109]
414	[756, 757]	1183	[1818, 1819]	1952	[2512, 2513]	2721	[1198, 2251]
415	[758, 759]	1184	[1733, 1820]	1953	[2514, 2515]	2722	[2933, 2087]
416	[760, 761]	1185	[1821, 1822]	1954	[2149, 2516]	2723	[1270, 2925]
417	[762, 740]	1186	[747, 1823]	1955	[2514, 2517]	2724	[1111, 2874]
418	[164, 763]	1187	[1824, 1408]	1956	[313, 2518]	2725	[2298, 2046]
419	[764, 765]	1188	[1609, 1410]	1957	[2178, 2193]	2726	[874, 891]
420	[766, 767]	1189	[1770, 1825]	1958	[864, 2433]	2727	[2126, 2366]
421	[768, 769]	1190	[1826, 1672]	1959	[1140, 2129]	2728	[2094, 2303]
422	[463, 770]	1191	[37, 499]	1960	[2519, 2520]	2729	[426, 2124]
423	[771, 772]	1192	[1528, 1827]	1961	[2158, 2521]	2730	[253, 2434]
424	[773, 774]	1193	[821, 1489]	1962	[2522, 2105]	2731	[2934, 2242]
425	[775, 524]	1194	[1728, 37]	1963	[2169, 954]	2732	[2248, 2059]
426	[230, 776]	1195	[503, 1828]	1964	[381, 2271]	2733	[2138, 1354]
427	[777, 778]	1196	[749, 142]	1965	[327, 1228]	2734	[2935, 2877]
428	[779, 780]	1197	[1829, 1830]	1966	[20, 2302]	2735	[2045, 2205]
429	[465, 781]	1198	[1831, 1832]	1967	[2523, 858]	2736	[1065, 397]
430	[566, 782]	1199	[1376, 673]	1968	[1192, 2524]	2737	[1083, 302]
431	[783, 784]	1200	[1760, 1833]	1969	[2525, 2429]	2738	[1109, 110]
432	[785, 786]	1201	[774, 680]	1970	[1165, 2526]	2739	[76, 340]
433	[787, 788]	1202	[8, 1834]	1971	[885, 2088]	2740	[2022, 2936]
434	[237, 789]	1203	[1835, 577]	1972	[2527, 2281]	2741	[1280, 2919]
435	[573, 790]	1204	[565, 1836]	1973	[2091, 2528]	2742	[1126, 1292]
436	[791, 167]	1205	[724, 1837]	1974	[2529, 1307]	2743	[1062, 2236]
437	[792, 793]	1206	[487, 513]	1975	[259, 2530]	2744	[1216, 2923]
438	[794, 795]	1207	[1838, 1732]	1976	[2531, 2532]	2745	[436, 1266]
439	[796, 797]	1208	[1839, 1533]	1977	[1311, 2533]	2746	[2316, 420]
440	[761, 798]	1209	[1840, 1804]	1978	[2534, 366]	2747	[2163, 2494]
441	[799, 800]	1210	[1841, 1842]	1979	[918, 905]	2748	[2130, 2937]
442	[681, 33]	1211	[588, 1843]	1980	[1144, 2535]	2749	[2536, 2233]
443	[801, 802]	1212	[1844, 1845]	1981	[246, 938]	2750	[2938, 1126]
444	[803, 804]	1213	[706, 1846]	1982	[2536, 2473]	2751	[1214, 384]
445	[805, 721]	1214	[1847, 32]	1983	[1046, 2537]	2752	[1330, 1306]
446	[806, 807]	1215	[1836, 782]	1984	[2538, 2539]	2753	[1202, 2939]
447	[808, 809]	1216	[695, 1848]	1985	[2540, 93]	2754	[445, 1003]
448	[810, 811]	1217	[620, 1849]	1986	[836, 123]	2755	[2940, 1204]
449	[812, 813]	1218	[1701, 518]	1987	[328, 1229]	2756	[2941, 1242]
450	[814, 815]	1219	[1463, 1850]	1988	[2541, 130]	2757	[2942, 2181]
451	[816, 817]	1220	[1755, 1851]	1989	[194, 2542]	2758	[1014, 1251]
452	[818, 819]	1221	[242, 821]	1990	[1741, 685]	2759	[2943, 2865]
453	[602, 820]	1222	[1852, 1628]	1991	[1667, 2543]	2760	[2396, 1345]
454	[821, 822]	1223	[1853, 1854]	1992	[2544, 1386]	2761	[1174, 88]
455	[823, 824]	1224	[725, 692]	1993	[674, 1970]	2762	[2944, 2456]

456	[825, 826]	1225	[746, 1855]	1994	[1410, 2545]	2763	[2945, 2929]
457	[827, 225]	1226	[508, 1457]	1995	[1927, 494]	2764	[1314, 1077]
458	[828, 829]	1227	[1801, 1644]	1996	[169, 505]	2765	[2946, 2858]
459	[830, 831]	1228	[480, 1856]	1997	[1856, 2546]	2766	[269, 2885]
460	[615, 832]	1229	[1857, 1493]	1998	[2547, 2548]	2767	[2947, 440]
461	[623, 833]	1230	[1829, 1858]	1999	[2549, 2550]	2768	[2512, 2869]
462	[834, 835]	1231	[1859, 130]	2000	[791, 1731]	2769	[461, 2465]
463	[388, 836]	1232	[804, 1860]	2001	[2551, 2552]	2770	[2948, 2434]
464	[837, 838]	1233	[468, 1861]	2002	[2553, 237]	2771	[258, 838]
465	[69, 839]	1234	[1862, 1863]	2003	[833, 2554]	2772	[2129, 1254]
466	[840, 841]	1235	[638, 1389]	2004	[2555, 630]	2773	[2065, 2380]
467	[842, 843]	1236	[1864, 1865]	2005	[1881, 53]	2774	[2243, 2030]
468	[446, 844]	1237	[1780, 1801]	2006	[1831, 1973]	2775	[394, 914]
469	[431, 845]	1238	[1866, 1633]	2007	[804, 581]	2776	[248, 2949]
470	[846, 847]	1239	[1867, 188]	2008	[182, 2556]	2777	[2057, 2912]
471	[848, 849]	1240	[1868, 1869]	2009	[53, 2557]	2778	[2242, 30]
472	[850, 851]	1241	[1776, 1870]	2010	[2558, 2559]	2779	[1343, 2950]
473	[852, 853]	1242	[1871, 1872]	2011	[491, 2560]	2780	[1247, 2951]
474	[854, 855]	1243	[1873, 1851]	2012	[722, 198]	2781	[1095, 1133]
475	[856, 857]	1244	[750, 143]	2013	[2561, 2562]	2782	[2034, 2386]
476	[371, 858]	1245	[1839, 1874]	2014	[2563, 1908]	2783	[2952, 1159]
477	[859, 860]	1246	[1875, 1876]	2015	[736, 1539]	2784	[2132, 1330]
478	[861, 862]	1247	[1541, 1877]	2016	[1604, 2564]	2785	[2953, 2954]
479	[863, 864]	1248	[1180, 1878]	2017	[1952, 1952]	2786	[2416, 2339]
480	[301, 865]	1249	[582, 1879]	2018	[2565, 2566]	2787	[2089, 1036]
481	[866, 867]	1250	[158, 1880]	2019	[651, 2567]	2788	[2955, 1032]
482	[868, 869]	1251	[1775, 1881]	2020	[2568, 1767]	2789	[2956, 1133]
483	[95, 870]	1252	[1389, 1882]	2021	[49, 771]	2790	[2957, 105]
484	[871, 872]	1253	[1883, 485]	2022	[693, 2569]	2791	[2958, 2474]
485	[452, 873]	1254	[1774, 1465]	2023	[1684, 1623]	2792	[1324, 2089]
486	[874, 875]	1255	[1450, 717]	2024	[1413, 2570]	2793	[2348, 1996]
487	[300, 876]	1256	[747, 1884]	2025	[812, 2571]	2794	[2452, 1347]
488	[877, 878]	1257	[1725, 689]	2026	[2572, 2573]	2795	[1252, 2888]
489	[879, 880]	1258	[195, 575]	2027	[1647, 2574]	2796	[408, 1033]
490	[881, 882]	1259	[1885, 1886]	2028	[1863, 1507]	2797	[2123, 2959]
491	[883, 884]	1260	[1887, 801]	2029	[693, 1955]	2798	[2144, 2939]
492	[885, 886]	1261	[819, 1627]	2030	[1701, 1949]	2799	[418, 2239]
493	[115, 887]	1262	[183, 757]	2031	[1427, 543]	2800	[1246, 342]
494	[372, 369]	1263	[1888, 1496]	2032	[2575, 2576]	2801	[2293, 2873]
495	[888, 889]	1264	[1889, 1890]	2033	[1771, 1886]	2802	[2960, 1147]
496	[890, 891]	1265	[1891, 1892]	2034	[2577, 1677]	2803	[2961, 2962]
497	[892, 893]	1266	[1893, 1387]	2035	[1420, 2542]	2804	[2257, 2066]
498	[350, 894]	1267	[167, 220]	2036	[2578, 2579]	2805	[2897, 2963]
499	[112, 895]	1268	[758, 1894]	2037	[1670, 2580]	2806	[934, 2964]

500	[866, 896]	1269	[1895, 1896]	2038	[2581, 756]	2807	[997, 2900]
501	[897, 898]	1270	[619, 1897]	2039	[2582, 1935]	2808	[441, 2532]
502	[899, 900]	1271	[1808, 1898]	2040	[547, 2546]	2809	[2965, 25]
503	[901, 902]	1272	[1899, 1673]	2041	[659, 2583]	2810	[106, 2966]
504	[903, 904]	1273	[1900, 1901]	2042	[831, 1584]	2811	[2471, 2132]
505	[905, 906]	1274	[1812, 1902]	2043	[1486, 2584]	2812	[2330, 2962]
506	[907, 377]	1275	[1903, 1904]	2044	[1746, 2585]	2813	[2395, 1287]
507	[858, 908]	1276	[1725, 12]	2045	[2586, 749]	2814	[2362, 2963]
508	[909, 910]	1277	[1905, 1432]	2046	[2587, 2588]	2815	[1271, 2967]
509	[911, 912]	1278	[1906, 636]	2047	[788, 59]	2816	[1185, 2520]
510	[913, 914]	1279	[1907, 1446]	2048	[1811, 1686]	2817	[2529, 1310]
511	[848, 915]	1280	[1908, 1909]	2049	[1685, 1385]	2818	[2516, 1150]
512	[916, 122]	1281	[1549, 659]	2050	[2544, 2589]	2819	[1159, 2966]
513	[291, 917]	1282	[1562, 1438]	2051	[674, 1681]	2820	[2457, 1089]
514	[918, 919]	1283	[589, 1910]	2052	[2590, 1399]	2821	[2291, 855]
515	[920, 309]	1284	[1911, 1499]	2053	[550, 465]	2822	[2179, 1270]
516	[921, 922]	1285	[682, 1912]	2054	[1590, 762]	2823	[2214, 2325]
517	[361, 923]	1286	[1913, 1914]	2055	[2591, 2592]	2824	[2968, 2967]
518	[924, 925]	1287	[1915, 1916]	2056	[1723, 2593]	2825	[103, 2933]
519	[926, 927]	1288	[203, 1551]	2057	[2594, 1820]	2826	[1301, 282]
520	[366, 928]	1289	[1571, 1420]	2058	[2595, 1662]	2827	[2969, 1135]
521	[379, 929]	1290	[1670, 1917]	2059	[2596, 2597]	2828	[2864, 2868]
522	[930, 931]	1291	[35, 1918]	2060	[1767, 2598]	2829	[405, 956]
523	[932, 933]	1292	[1740, 477]	2061	[605, 1927]	2830	[1265, 2916]
524	[934, 935]	1293	[1620, 1919]	2062	[2599, 1431]	2831	[1204, 2533]
525	[936, 876]	1294	[1920, 1556]	2063	[1405, 1512]	2832	[2970, 2149]
526	[937, 938]	1295	[1582, 1921]	2064	[235, 1388]	2833	[2971, 96]
527	[309, 939]	1296	[1445, 1922]	2065	[192, 1927]	2834	[1037, 2922]
528	[940, 941]	1297	[1923, 1431]	2066	[518, 2600]	2835	[2474, 2089]
529	[942, 943]	1298	[216, 1924]	2067	[1396, 2601]	2836	[2972, 2871]
530	[944, 945]	1299	[1925, 169]	2068	[1978, 2602]	2837	[980, 2197]
531	[946, 73]	1300	[1425, 1926]	2069	[2603, 2604]	2838	[2973, 2926]
532	[285, 947]	1301	[236, 484]	2070	[2605, 2581]	2839	[1046, 1258]
533	[948, 949]	1302	[1927, 1928]	2071	[715, 2606]	2840	[17, 1183]
534	[945, 950]	1303	[1929, 1930]	2072	[2607, 1759]	2841	[4, 2144]
535	[73, 402]	1304	[738, 1931]	2073	[590, 1797]	2842	[923, 965]
536	[947, 951]	1305	[1932, 1933]	2074	[2608, 1833]	2843	[2028, 2974]
537	[949, 952]	1306	[1934, 1935]	2075	[2609, 2610]	2844	[1257, 2975]
538	[953, 954]	1307	[1881, 1936]	2076	[677, 232]	2845	[2976, 2278]
539	[931, 955]	1308	[766, 560]	2077	[1391, 1575]	2846	[2977, 2442]
540	[956, 957]	1309	[1937, 1609]	2078	[1400, 1693]	2847	[449, 423]
541	[958, 426]	1310	[1938, 1939]	2079	[1523, 1526]	2848	[2288, 2289]
542	[959, 960]	1311	[1415, 1940]	2080	[1637, 1738]	2849	[2978, 1196]
543	[961, 962]	1312	[1635, 1941]	2081	[1402, 1983]	2850	[2979, 338]

544	[963, 964]	1313	[578, 768]	2082	[2611, 1736]	2851	[2314, 880]
545	[965, 966]	1314	[12, 1942]	2083	[2612, 771]	2852	[1181, 1181]
546	[907, 319]	1315	[1813, 468]	2084	[2613, 1471]	2853	[1232, 65]
547	[864, 967]	1316	[722, 1943]	2085	[824, 1760]	2854	[2537, 2374]
548	[968, 969]	1317	[1569, 1944]	2086	[1477, 242]	2855	[1125, 2975]
549	[970, 971]	1318	[1397, 1945]	2087	[653, 201]	2856	[2980, 168]
550	[972, 973]	1319	[1605, 1946]	2088	[1806, 1380]	2857	[140, 1891]
551	[974, 303]	1320	[1947, 1418]	2089	[1663, 2614]	2858	[1780, 1643]
552	[975, 976]	1321	[1591, 1589]	2090	[147, 532]	2859	[2981, 739]
553	[977, 978]	1322	[1799, 151]	2091	[1540, 2615]	2860	[2731, 2795]
554	[979, 980]	1323	[1424, 1467]	2092	[1604, 1538]	2861	[10, 2982]
555	[981, 982]	1324	[770, 1948]	2093	[2616, 1521]	2862	[2733, 766]
556	[983, 984]	1325	[1949, 519]	2094	[40, 2617]	2863	[2983, 766]
557	[246, 985]	1326	[1950, 224]	2095	[810, 1498]	2864	[651, 2984]
558	[964, 986]	1327	[1951, 1952]	2096	[2618, 698]	2865	[667, 674]
559	[987, 988]	1328	[663, 608]	2097	[2619, 619]	2866	[1645, 769]
560	[989, 990]	1329	[1400, 1887]	2098	[2620, 473]	2867	[1787, 1768]
561	[991, 992]	1330	[1953, 1954]	2099	[198, 828]	2868	[633, 2985]
562	[993, 994]	1331	[662, 1955]	2100	[2621, 2622]	2869	[1648, 2986]
563	[995, 996]	1332	[170, 810]	2101	[1877, 532]	2870	[2987, 1918]
564	[997, 998]	1333	[1956, 1610]	2102	[1406, 1953]	2871	[765, 671]
565	[999, 1000]	1334	[657, 725]	2103	[2623, 2580]	2872	[772, 2663]
566	[1001, 1002]	1335	[1837, 1957]	2104	[2624, 1741]	2873	[1633, 2579]
567	[925, 1003]	1336	[1878, 1878]	2105	[2625, 2626]	2874	[617, 1667]
568	[1004, 1005]	1337	[148, 1958]	2106	[1943, 828]	2875	[694, 187]
569	[1006, 1007]	1338	[765, 1959]	2107	[209, 2627]	2876	[618, 2543]
570	[411, 1008]	1339	[1960, 227]	2108	[1434, 798]	2877	[1967, 2988]
571	[1009, 1010]	1340	[1896, 1961]	2109	[2628, 2629]	2878	[1731, 220]
572	[380, 1011]	1341	[1962, 1963]	2110	[2630, 1722]	2879	[2640, 2555]
573	[1012, 1013]	1342	[741, 1620]	2111	[1442, 2631]	2880	[1372, 1863]
574	[1014, 1015]	1343	[1964, 1965]	2112	[178, 2632]	2881	[47, 1641]
575	[439, 1016]	1344	[1966, 1729]	2113	[2633, 2634]	2882	[1401, 1722]
576	[1017, 1018]	1345	[1967, 1968]	2114	[185, 2635]	2883	[2662, 1971]
577	[1019, 1020]	1346	[1926, 579]	2115	[2553, 2550]	2884	[2989, 2990]
578	[1021, 1022]	1347	[1969, 602]	2116	[1922, 2636]	2885	[754, 2722]
579	[1023, 1010]	1348	[139, 717]	2117	[524, 202]	2886	[243, 188]
580	[92, 1024]	1349	[1558, 1970]	2118	[787, 1425]	2887	[244, 2669]
581	[249, 1025]	1350	[567, 1963]	2119	[2637, 2638]	2888	[1938, 2552]
582	[1026, 1027]	1351	[207, 1971]	2120	[485, 2621]	2889	[1538, 1536]
583	[372, 908]	1352	[1972, 1973]	2121	[2639, 603]	2890	[2991, 2985]
584	[1028, 1029]	1353	[1769, 1974]	2122	[824, 2608]	2891	[129, 1855]
585	[390, 1030]	1354	[225, 1792]	2123	[212, 1828]	2892	[636, 2730]
586	[910, 1031]	1355	[490, 677]	2124	[2640, 629]	2893	[1928, 495]
587	[1032, 1033]	1356	[168, 1975]	2125	[523, 763]	2894	[534, 1604]

588	[1011, 305]	1357	[1976, 1814]	2126	[2641, 2642]	2895	[2992, 2570]
589	[920, 1034]	1358	[1897, 1849]	2127	[1764, 586]	2896	[635, 2993]
590	[1035, 1036]	1359	[1404, 1977]	2128	[768, 2643]	2897	[1512, 1587]
591	[1037, 1038]	1360	[1978, 1979]	2129	[1499, 2644]	2898	[627, 1499]
592	[1039, 1040]	1361	[657, 691]	2130	[2645, 2646]	2899	[2994, 2657]
593	[1041, 1042]	1362	[1980, 1981]	2131	[2647, 1880]	2900	[648, 1837]
594	[1043, 1044]	1363	[1813, 1982]	2132	[2648, 2649]	2901	[640, 2691]
595	[1045, 1046]	1364	[1722, 1983]	2133	[611, 668]	2902	[735, 2700]
596	[1047, 1048]	1365	[1984, 1551]	2134	[1853, 2650]	2903	[2648, 2660]
597	[1049, 928]	1366	[161, 1921]	2135	[2651, 2652]	2904	[2995, 2585]
598	[1050, 1012]	1367	[1985, 10]	2136	[40, 467]	2905	[1381, 1908]
599	[901, 1051]	1368	[770, 1986]	2137	[2653, 1806]	2906	[2748, 2996]
600	[1052, 872]	1369	[1844, 1987]	2138	[2654, 2655]	2907	[2997, 2843]
601	[64, 1053]	1370	[1988, 1989]	2139	[2656, 1416]	2908	[780, 2746]
602	[958, 280]	1371	[1990, 1991]	2140	[175, 2657]	2909	[2998, 1673]
603	[856, 1054]	1372	[1191, 1992]	2141	[2658, 1791]	2910	[1698, 715]
604	[1055, 1056]	1373	[1329, 1305]	2142	[792, 1588]	2911	[1751, 134]
605	[409, 1057]	1374	[1049, 1993]	2143	[2659, 2660]	2912	[1712, 677]
606	[1058, 1059]	1375	[1994, 1995]	2144	[2661, 1956]	2913	[2999, 1508]
607	[1060, 1061]	1376	[1300, 1996]	2145	[152, 803]	2914	[2747, 1871]
608	[1062, 1063]	1377	[1997, 79]	2146	[1501, 2662]	2915	[3000, 2749]
609	[386, 115]	1378	[949, 1318]	2147	[663, 2663]	2916	[2625, 1896]
610	[1064, 1065]	1379	[1232, 1998]	2148	[2664, 2665]	2917	[3001, 1702]
611	[1066, 1067]	1380	[1145, 1236]	2149	[1818, 2666]	2918	[2692, 3002]
612	[1068, 1069]	1381	[1999, 2000]	2150	[2667, 708]	2919	[1446, 2636]
613	[951, 1070]	1382	[108, 1212]	2151	[1650, 1930]	2920	[3003, 1966]
614	[422, 1071]	1383	[2001, 2002]	2152	[1790, 1488]	2921	[743, 2853]
615	[845, 1072]	1384	[2003, 2004]	2153	[1903, 694]	2922	[2697, 3004]
616	[1073, 1074]	1385	[1252, 2005]	2154	[752, 2668]	2923	[1782, 654]
617	[1075, 1076]	1386	[104, 848]	2155	[188, 2669]	2924	[3005, 1667]
618	[1077, 1078]	1387	[1073, 2006]	2156	[137, 2670]	2925	[1896, 3006]
619	[842, 1079]	1388	[445, 2007]	2157	[1601, 1655]	2926	[1655, 2674]
620	[423, 1080]	1389	[2008, 2009]	2158	[1676, 2671]	2927	[3007, 2840]
621	[330, 1081]	1390	[340, 2010]	2159	[1960, 1804]	2928	[2550, 789]
622	[1082, 1083]	1391	[1141, 2011]	2160	[2672, 735]	2929	[218, 1821]
623	[1084, 1085]	1392	[394, 2012]	2161	[684, 1405]	2930	[1876, 3004]
624	[362, 1086]	1393	[2013, 1261]	2162	[658, 1980]	2931	[2791, 2990]
625	[1087, 121]	1394	[2014, 1169]	2163	[2673, 466]	2932	[2590, 661]
626	[1088, 1089]	1395	[1336, 2015]	2164	[1602, 2674]	2933	[2555, 3008]
627	[1090, 1091]	1396	[2016, 2017]	2165	[2628, 2675]	2934	[3009, 1854]
628	[273, 1092]	1397	[2018, 2019]	2166	[41, 601]	2935	[2655, 3002]
629	[993, 1093]	1398	[1264, 1137]	2167	[535, 1538]	2936	[695, 8]
630	[1094, 1052]	1399	[2020, 2021]	2168	[737, 146]	2937	[55, 3010]
631	[1095, 1096]	1400	[378, 2022]	2169	[1952, 1951]	2938	[697, 1686]

632	[1097, 1098]	1401	[2023, 2024]	2170	[532, 1396]	2939	[10, 2706]
633	[1099, 1100]	1402	[1266, 2025]	2171	[146, 1877]	2940	[1699, 2801]
634	[1101, 1102]	1403	[1203, 1311]	2172	[533, 2601]	2941	[2721, 1600]
635	[293, 1103]	1404	[2026, 2027]	2173	[1540, 531]	2942	[156, 2670]
636	[337, 1104]	1405	[2028, 2029]	2174	[2676, 1577]	2943	[3011, 1688]
637	[1105, 1106]	1406	[2030, 2031]	2175	[1665, 2677]	2944	[1491, 1678]
638	[1107, 1108]	1407	[1146, 2032]	2176	[1852, 808]	2945	[3012, 2829]
639	[836, 1109]	1408	[1217, 2033]	2177	[2678, 51]	2946	[628, 1500]
640	[1110, 1111]	1409	[2034, 2035]	2178	[2679, 645]	2947	[3013, 1795]
641	[1112, 1113]	1410	[2036, 2037]	2179	[1974, 1825]	2948	[3014, 2808]
642	[370, 1114]	1411	[294, 2038]	2180	[1762, 2680]	2949	[1871, 2996]
643	[1115, 1116]	1412	[2039, 2040]	2181	[589, 2681]	2950	[1517, 3015]
644	[1117, 1118]	1413	[119, 2041]	2182	[2682, 2683]	2951	[1815, 2665]
645	[1119, 1120]	1414	[868, 79]	2183	[1611, 2684]	2952	[3016, 1510]
646	[1121, 1122]	1415	[2042, 2043]	2184	[638, 744]	2953	[1409, 1468]
647	[453, 1123]	1416	[1357, 2044]	2185	[2589, 610]	2954	[219, 1822]
648	[1124, 1125]	1417	[2045, 409]	2186	[1454, 749]	2955	[3017, 1633]
649	[1126, 1068]	1418	[285, 2046]	2187	[1758, 1665]	2956	[3018, 1482]
650	[1127, 399]	1419	[2047, 309]	2188	[1766, 1557]	2957	[3019, 2810]
651	[321, 1128]	1420	[1324, 1035]	2189	[1642, 522]	2958	[3020, 2764]
652	[1129, 1130]	1421	[1349, 2048]	2190	[700, 1466]	2959	[1520, 3021]
653	[1131, 1132]	1422	[362, 965]	2191	[1775, 1618]	2960	[1691, 494]
654	[1133, 1134]	1423	[2049, 2050]	2192	[1797, 154]	2961	[1596, 1980]
655	[311, 1135]	1424	[2051, 1045]	2193	[551, 136]	2962	[1408, 1467]
656	[1136, 1137]	1425	[2052, 2053]	2194	[684, 1511]	2963	[1573, 130]
657	[1138, 1139]	1426	[373, 1118]	2195	[1883, 688]	2964	[1583, 722]
658	[1140, 1141]	1427	[326, 314]	2196	[1908, 1580]	2965	[1618, 53]
659	[1125, 1142]	1428	[2054, 416]	2197	[1576, 2685]	2966	[548, 517]
660	[1143, 1144]	1429	[2055, 2056]	2198	[1478, 1615]	2967	[2797, 2671]
661	[1145, 1146]	1430	[2032, 1088]	2199	[1897, 1769]	2968	[3022, 164]
662	[1147, 1148]	1431	[2057, 2058]	2200	[2686, 2687]	2969	[3023, 1602]
663	[1149, 934]	1432	[2059, 453]	2201	[551, 781]	2970	[1455, 750]
664	[1150, 1151]	1433	[2060, 2061]	2202	[1659, 1569]	2971	[3024, 1871]
665	[1152, 1153]	1434	[1310, 2062]	2203	[635, 2688]	2972	[3025, 621]
666	[1154, 1155]	1435	[860, 2063]	2204	[1460, 2567]	2973	[3026, 1987]
667	[1156, 1157]	1436	[121, 2064]	2205	[1566, 2689]	2974	[2673, 40]
668	[1065, 1055]	1437	[1270, 1119]	2206	[731, 1525]	2975	[481, 699]
669	[1158, 1159]	1438	[2065, 1994]	2207	[2599, 1905]	2976	[3027, 1958]
670	[888, 1160]	1439	[2066, 416]	2208	[1773, 1789]	2977	[1693, 2740]
671	[1161, 1162]	1440	[2067, 2068]	2209	[1716, 2690]	2978	[3028, 1443]
672	[1163, 1082]	1441	[840, 1280]	2210	[1692, 1684]	2979	[3029, 1379]
673	[1164, 1165]	1442	[2069, 70]	2211	[2632, 2691]	2980	[3030, 259]
674	[359, 1166]	1443	[353, 2070]	2212	[2654, 2692]	2981	[3031, 843]
675	[1167, 1168]	1444	[390, 2071]	2213	[2601, 537]	2982	[1167, 2954]

676	[987, 1169]	1445	[2072, 2073]	2214	[1526, 1986]	2983	[3032, 989]
677	[961, 1170]	1446	[2074, 2075]	2215	[699, 561]	2984	[399, 81]
678	[882, 837]	1447	[426, 281]	2216	[1904, 187]	2985	[2887, 23]
679	[1171, 1172]	1448	[1346, 2076]	2217	[240, 135]	2986	[2319, 2481]
680	[845, 1173]	1449	[849, 2077]	2218	[585, 1389]	2987	[2896, 2138]
681	[1174, 974]	1450	[857, 2078]	2219	[723, 648]	2988	[1147, 1145]
682	[29, 1175]	1451	[2079, 279]	2220	[127, 1981]	2989	[2134, 1278]
683	[5, 1176]	1452	[1036, 2080]	2221	[1817, 2693]	2990	[375, 941]
684	[1177, 1178]	1453	[291, 391]	2222	[51, 1371]	2991	[2435, 2428]
685	[1179, 29]	1454	[2081, 2082]	2223	[1893, 235]	2992	[3033, 2861]
686	[1180, 1181]	1455	[2083, 449]	2224	[1417, 213]	2993	[1240, 255]
687	[1182, 1183]	1456	[2084, 2085]	2225	[825, 1586]	2994	[3034, 896]
688	[263, 1184]	1457	[908, 1359]	2226	[2694, 624]	2995	[1048, 1042]
689	[1185, 1186]	1458	[910, 2086]	2227	[2695, 2696]	2996	[415, 341]
690	[1187, 1188]	1459	[2087, 2088]	2228	[1875, 2697]	2997	[3035, 1300]
691	[1137, 1189]	1460	[2089, 1131]	2229	[1462, 530]	2998	[1078, 1102]
692	[1190, 1191]	1461	[402, 2090]	2230	[531, 1603]	2999	[978, 1317]
693	[1192, 1193]	1462	[2091, 2092]	2231	[2698, 2699]	3000	[3036, 2490]
694	[1194, 17]	1463	[2093, 913]	2232	[706, 2700]	3001	[3037, 2068]
695	[970, 1195]	1464	[908, 370]	2233	[1857, 2701]	3002	[2933, 885]
696	[1196, 955]	1465	[2094, 2095]	2234	[544, 475]	3003	[3038, 2004]
697	[355, 1197]	1466	[2096, 358]	2235	[688, 2621]	3004	[2227, 2892]
698	[76, 1198]	1467	[2097, 1129]	2236	[1653, 2592]	3005	[419, 2394]
699	[1199, 1200]	1468	[2098, 2099]	2237	[2702, 222]	3006	[2476, 2933]
700	[1201, 1202]	1469	[977, 1316]	2238	[2703, 2581]	3007	[2427, 1219]
701	[1203, 1204]	1470	[2100, 923]	2239	[1446, 2704]	3008	[96, 2949]
702	[1205, 1206]	1471	[2101, 953]	2240	[1899, 1915]	3009	[320, 2163]
703	[1207, 1208]	1472	[80, 2102]	2241	[2705, 2706]	3010	[77, 2332]
704	[66, 1041]	1473	[268, 970]	2242	[1527, 1900]	3011	[1339, 2353]
705	[1209, 1152]	1474	[2103, 357]	2243	[2707, 2708]	3012	[1241, 2886]
706	[1210, 1211]	1475	[2104, 2105]	2244	[2709, 1777]	3013	[3039, 2951]
707	[1212, 1213]	1476	[2106, 457]	2245	[483, 2710]	3014	[3040, 2427]
708	[274, 1214]	1477	[1316, 2107]	2246	[2596, 2652]	3015	[1139, 2031]
709	[1215, 1216]	1478	[2108, 2109]	2247	[2711, 183]	3016	[90, 2112]
710	[1217, 1218]	1479	[2110, 2111]	2248	[1610, 1411]	3017	[1114, 2194]
711	[1219, 74]	1480	[2112, 1220]	2249	[832, 803]	3018	[2265, 2264]
712	[446, 1220]	1481	[1187, 2113]	2250	[1953, 1429]	3019	[3041, 2298]
713	[1221, 453]	1482	[2114, 2115]	2251	[153, 580]	3020	[1015, 2263]
714	[1222, 1077]	1483	[2116, 2117]	2252	[827, 1791]	3021	[1198, 2010]
715	[873, 1223]	1484	[915, 2077]	2253	[2611, 2712]	3022	[3042, 2070]
716	[1224, 1144]	1485	[2008, 2118]	2254	[514, 2713]	3023	[1296, 2282]
717	[986, 1225]	1486	[2119, 2120]	2255	[2714, 1763]	3024	[3043, 415]
718	[272, 1226]	1487	[2121, 2073]	2256	[224, 174]	3025	[3044, 2118]
719	[74, 403]	1488	[456, 2122]	2257	[1934, 2715]	3026	[3045, 900]

720	[267, 293]	1489	[2123, 989]	2258	[2577, 615]	3027	[2180, 2925]
721	[109, 382]	1490	[2124, 2125]	2259	[801, 2716]	3028	[88, 2407]
722	[1088, 1227]	1491	[2126, 2127]	2260	[2653, 1379]	3029	[3046, 2524]
723	[1228, 1229]	1492	[2128, 2129]	2261	[1847, 1555]	3030	[3047, 1774]
724	[1030, 1230]	1493	[1149, 898]	2262	[2697, 2717]	3031	[3048, 720]
725	[1231, 1232]	1494	[2130, 1334]	2263	[1866, 2578]	3032	[3049, 1383]
726	[1101, 1233]	1495	[2131, 2132]	2264	[631, 2718]	3033	[2663, 2806]
727	[1234, 1235]	1496	[75, 339]	2265	[1727, 631]	3034	[3050, 2988]
728	[1236, 1237]	1497	[328, 2133]	2266	[1739, 1742]	3035	[1765, 587]
729	[846, 1238]	1498	[330, 460]	2267	[1534, 2719]	3036	[3051, 2687]
730	[1239, 282]	1499	[2013, 2134]	2268	[2720, 606]	3037	[3052, 2602]
731	[1240, 1241]	1500	[2135, 2136]	2269	[1681, 1515]	3038	[3053, 1808]
732	[323, 1242]	1501	[2137, 885]	2270	[764, 670]	3039	[3054, 1464]
733	[1243, 1244]	1502	[1274, 1283]	2271	[699, 2721]	3040	[3055, 1398]
734	[1245, 964]	1503	[457, 2138]	2272	[1611, 2556]	3041	[3056, 1946]
735	[415, 1246]	1504	[2139, 85]	2273	[2722, 2723]	3042	[3057, 780]
736	[1247, 1248]	1505	[1213, 2140]	2274	[2724, 1378]	3043	[3058, 636]
737	[951, 286]	1506	[66, 1048]	2275	[153, 804]	3044	[3059, 574]
738	[1249, 1250]	1507	[2141, 2142]	2276	[486, 2622]	3045	[3060, 2986]
739	[1110, 1199]	1508	[261, 1085]	2277	[2725, 1518]	3046	[3061, 1843]
740	[1251, 1252]	1509	[2143, 1074]	2278	[2686, 2726]	3047	[3, 1201]
741	[1253, 881]	1510	[1201, 2144]	2279	[1982, 1861]	3048	[3062, 1043]
742	[1141, 1254]	1511	[1176, 1314]	2280	[1431, 2727]	3049	[2240, 1338]
743	[1139, 1255]	1512	[894, 2145]	2281	[1786, 1482]	3050	[2205, 410]
744	[1033, 1256]	1513	[919, 2146]	2282	[624, 2554]	3051	[2959, 990]
745	[1124, 1257]	1514	[952, 1319]	2283	[1509, 2728]	3052	[2950, 2918]
746	[1258, 932]	1515	[1166, 2147]	2284	[2729, 2730]	3053	[3063, 2932]
747	[1259, 1260]	1516	[2051, 348]	2285	[1793, 141]	3054	[1286, 2266]
748	[1261, 1262]	1517	[2148, 1337]	2286	[2558, 1503]	3055	[1998, 1047]
749	[871, 1263]	1518	[1190, 2149]	2287	[2731, 2732]	3056	[432, 1173]
750	[1264, 1265]	1519	[100, 863]	2288	[2733, 559]	3057	[3064, 1051]
751	[1266, 1267]	1520	[2150, 2151]	2289	[1631, 2696]	3058	[2426, 1105]
752	[6, 1222]	1521	[991, 984]	2290	[1759, 2677]	3059	[3065, 2509]
753	[1166, 1268]	1522	[2152, 2136]	2291	[2734, 2735]	3060	[1086, 1351]
754	[1269, 1270]	1523	[936, 2153]	2292	[814, 2736]	3061	[3066, 2391]
755	[1271, 1272]	1524	[295, 2154]	2293	[2737, 1894]	3062	[3067, 2851]
756	[1273, 1274]	1525	[282, 2155]	2294	[1798, 2738]	3063	[3068, 2738]
757	[1275, 1276]	1526	[835, 2156]	2295	[499, 2739]	3064	[3069, 182]
758	[1277, 377]	1527	[2157, 65]	2296	[1887, 2740]	3065	[3070, 2722]
759	[1261, 1278]	1528	[2158, 2159]	2297	[761, 2741]	3066	[3071, 492]
760	[1279, 1280]	1529	[2160, 2161]	2298	[1544, 2742]	3067	[2209, 2297]
761	[451, 1281]	1530	[2071, 2162]	2299	[1794, 2743]	3068	[3072, 113]
762	[1282, 1253]	1531	[378, 2163]	2300	[2744, 2745]	3069	[2374, 2469]
763	[316, 1283]	1532	[2164, 2044]	2301	[1864, 2746]	3070	[917, 2479]

764	[1284, 1140]	1533	[1072, 2165]	2302	[2747, 2748]	3071	[898, 2964]
765	[1285, 1286]	1534	[1034, 939]	2303	[716, 1596]	3072	[3073, 774]
766	[1287, 1288]	1535	[411, 2166]	2304	[711, 2749]	3073	[2105, 2448]
767	[859, 883]	1536	[2167, 944]	2305	[1574, 823]		
768	[980, 1289]	1537	[2168, 946]	2306	[702, 508]		

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	513	0	1026	0	1539	1	2052	1	2565	0
1	0	514	1	1027	0	1540	1	2053	0	2566	1
2	0	515	1	1028	1	1541	1	2054	0	2567	0
3	0	516	0	1029	0	1542	0	2055	0	2568	1
4	0	517	0	1030	1	1543	1	2056	0	2569	0
5	0	518	1	1031	0	1544	1	2057	0	2570	1
6	1	519	0	1032	1	1545	0	2058	0	2571	1
7	0	520	0	1033	1	1546	0	2059	1	2572	1
8	0	521	1	1034	0	1547	0	2060	1	2573	1
9	0	522	0	1035	0	1548	1	2061	1	2574	0
10	1	523	0	1036	0	1549	0	2062	1	2575	1
11	0	524	0	1037	1	1550	1	2063	1	2576	1
12	1	525	1	1038	0	1551	1	2064	0	2577	1
13	1	526	0	1039	1	1552	1	2065	0	2578	0
14	1	527	1	1040	1	1553	1	2066	1	2579	0
15	0	528	1	1041	1	1554	1	2067	1	2580	1
16	0	529	0	1042	1	1555	1	2068	1	2581	1
17	0	530	0	1043	1	1556	1	2069	0	2582	0
18	0	531	0	1044	0	1557	0	2070	1	2583	0
19	0	532	0	1045	1	1558	1	2071	0	2584	1
20	1	533	0	1046	1	1559	1	2072	1	2585	0
21	1	534	1	1047	1	1560	0	2073	0	2586	0
22	0	535	0	1048	0	1561	1	2074	1	2587	1
23	0	536	0	1049	1	1562	0	2075	0	2588	0
24	1	537	0	1050	1	1563	0	2076	1	2589	1
25	1	538	0	1051	1	1564	1	2077	0	2590	1
26	0	539	0	1052	0	1565	0	2078	0	2591	0
27	1	540	0	1053	0	1566	0	2079	1	2592	0
28	0	541	1	1054	0	1567	1	2080	1	2593	1
29	1	542	1	1055	0	1568	0	2081	1	2594	0
30	1	543	1	1056	1	1569	1	2082	0	2595	0
31	0	544	0	1057	0	1570	1	2083	0	2596	1
32	0	545	1	1058	1	1571	0	2084	0	2597	1
33	0	546	0	1059	1	1572	1	2085	1	2598	1
34	1	547	0	1060	1	1573	1	2086	1	2599	1
35	0	548	1	1061	1	1574	1	2087	1	2600	1

36	0	549	1	1062	0	1575	0	2088	0	2601	1
37	0	550	0	1063	0	1576	1	2089	1	2602	0
38	1	551	0	1064	0	1577	1	2090	1	2603	0
39	0	552	0	1065	1	1578	1	2091	1	2604	1
40	0	553	0	1066	1	1579	0	2092	1	2605	1
41	1	554	0	1067	0	1580	1	2093	1	2606	1
42	0	555	1	1068	0	1581	1	2094	0	2607	1
43	1	556	1	1069	0	1582	1	2095	1	2608	1
44	0	557	1	1070	0	1583	1	2096	1	2609	0
45	0	558	0	1071	1	1584	1	2097	0	2610	1
46	0	559	1	1072	0	1585	0	2098	0	2611	0
47	0	560	1	1073	1	1586	1	2099	1	2612	0
48	1	561	0	1074	0	1587	0	2100	1	2613	0
49	1	562	0	1075	1	1588	0	2101	0	2614	0
50	0	563	1	1076	0	1589	1	2102	1	2615	1
51	1	564	1	1077	1	1590	0	2103	1	2616	1
52	0	565	1	1078	1	1591	1	2104	0	2617	1
53	0	566	0	1079	0	1592	1	2105	1	2618	1
54	1	567	0	1080	1	1593	1	2106	0	2619	0
55	1	568	0	1081	1	1594	1	2107	0	2620	0
56	0	569	1	1082	0	1595	1	2108	0	2621	1
57	0	570	0	1083	0	1596	1	2109	0	2622	0
58	1	571	0	1084	1	1597	0	2110	0	2623	1
59	1	572	0	1085	0	1598	1	2111	0	2624	0
60	0	573	0	1086	0	1599	1	2112	1	2625	1
61	1	574	1	1087	1	1600	1	2113	1	2626	0
62	0	575	1	1088	1	1601	0	2114	0	2627	0
63	0	576	1	1089	1	1602	0	2115	0	2628	0
64	1	577	1	1090	1	1603	0	2116	0	2629	0
65	0	578	0	1091	0	1604	1	2117	0	2630	0
66	0	579	1	1092	1	1605	0	2118	1	2631	1
67	0	580	0	1093	1	1606	0	2119	0	2632	0
68	1	581	1	1094	0	1607	1	2120	0	2633	1
69	1	582	0	1095	1	1608	0	2121	0	2634	1
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72	0	585	0	1098	0	1611	1	2124	1	2637	0
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74	0	587	1	1100	0	1613	0	2126	0	2639	0
75	0	588	0	1101	0	1614	1	2127	1	2640	1
76	0	589	1	1102	1	1615	1	2128	1	2641	0
77	1	590	0	1103	0	1616	1	2129	1	2642	0
78	1	591	1	1104	0	1617	0	2130	0	2643	0
79	0	592	1	1105	1	1618	0	2131	1	2644	1

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83	1	596	1	1109	1	1622	1	2135	0	2648	1
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85	0	598	1	1111	0	1624	0	2137	0	2650	0
86	1	599	0	1112	0	1625	1	2138	1	2651	0
87	1	600	0	1113	0	1626	0	2139	1	2652	0
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90	1	603	0	1116	1	1629	1	2142	1	2655	0
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92	0	605	1	1118	0	1631	1	2144	1	2657	1
93	0	606	1	1119	0	1632	0	2145	0	2658	1
94	0	607	1	1120	1	1633	1	2146	0	2659	0
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97	0	610	0	1123	1	1636	1	2149	1	2662	0
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99	0	612	0	1125	0	1638	0	2151	0	2664	0
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104	0	617	1	1130	1	1643	1	2156	1	2669	1
105	1	618	1	1131	1	1644	0	2157	0	2670	0
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115	0	628	0	1141	0	1654	1	2167	0	2680	1
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129	1	642	0	1155	1	1668	0	2181	1	2694	0
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135	1	648	0	1161	1	1674	1	2187	0	2700	1
136	1	649	1	1162	0	1675	1	2188	0	2701	1
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142	0	655	0	1168	0	1681	0	2194	1	2707	1
143	0	656	0	1169	0	1682	0	2195	0	2708	0
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148	0	661	0	1174	0	1687	1	2200	1	2713	0
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155	1	668	1	1181	1	1694	0	2207	1	2720	0
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157	0	670	0	1183	1	1696	1	2209	1	2722	1
158	0	671	1	1184	1	1697	1	2210	0	2723	0
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161	0	674	0	1187	0	1700	0	2213	1	2726	0
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171	1	684	1	1197	1	1710	0	2223	1	2736	1
172	0	685	0	1198	1	1711	1	2224	0	2737	0
173	1	686	0	1199	1	1712	1	2225	1	2738	1
174	0	687	1	1200	0	1713	0	2226	0	2739	0
175	1	688	1	1201	1	1714	1	2227	0	2740	0
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178	1	691	1	1204	1	1717	0	2230	0	2743	0
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183	0	696	1	1209	0	1722	0	2235	1	2748	0
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185	0	698	0	1211	0	1724	0	2237	0	2750	0
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188	0	701	0	1214	0	1727	0	2240	0	2753	0
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206	1	719	0	1232	1	1745	0	2258	1	2771	0
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208	1	721	0	1234	1	1747	1	2260	0	2773	0
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210	1	723	1	1236	1	1749	0	2262	1	2775	1
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215	0	728	1	1241	0	1754	1	2267	0	2780	1
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345	1	858	0	1371	1	1884	0	2397	1	2910	1
346	0	859	0	1372	0	1885	1	2398	1	2911	1
347	1	860	1	1373	0	1886	0	2399	0	2912	1
348	0	861	1	1374	1	1887	0	2400	0	2913	0
349	0	862	0	1375	0	1888	0	2401	1	2914	1
350	0	863	0	1376	1	1889	1	2402	1	2915	0
351	0	864	0	1377	1	1890	1	2403	1	2916	1
352	1	865	0	1378	0	1891	0	2404	1	2917	0
353	0	866	1	1379	1	1892	0	2405	1	2918	1
354	0	867	0	1380	0	1893	1	2406	1	2919	1
355	0	868	0	1381	1	1894	0	2407	1	2920	1
356	0	869	1	1382	1	1895	0	2408	1	2921	0
357	0	870	0	1383	1	1896	1	2409	1	2922	1
358	0	871	1	1384	0	1897	0	2410	0	2923	1
359	0	872	1	1385	0	1898	0	2411	0	2924	0
360	1	873	0	1386	0	1899	0	2412	1	2925	1
361	0	874	0	1387	1	1900	1	2413	0	2926	1
362	1	875	0	1388	1	1901	0	2414	0	2927	1
363	0	876	0	1389	0	1902	0	2415	0	2928	0
364	0	877	1	1390	0	1903	1	2416	0	2929	0
365	0	878	0	1391	0	1904	1	2417	0	2930	0
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367	1	880	1	1393	1	1906	1	2419	0	2932	1
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372	1	885	0	1398	1	1911	0	2424	1	2937	1
373	1	886	1	1399	1	1912	0	2425	1	2938	0
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375	0	888	0	1401	1	1914	1	2427	1	2940	1
376	1	889	0	1402	1	1915	0	2428	1	2941	1
377	0	890	1	1403	0	1916	0	2429	0	2942	0
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385	1	898	1	1411	0	1924	0	2437	0	2950	0
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387	1	900	1	1413	0	1926	0	2439	1	2952	1

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391	0	904	1	1417	0	1930	1	2443	0	2956	0
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393	0	906	1	1419	0	1932	0	2445	1	2958	1
394	1	907	0	1420	1	1933	0	2446	0	2959	0
395	1	908	1	1421	1	1934	1	2447	0	2960	0
396	0	909	0	1422	1	1935	1	2448	1	2961	1
397	1	910	0	1423	1	1936	1	2449	1	2962	1
398	0	911	1	1424	0	1937	0	2450	1	2963	1
399	1	912	1	1425	1	1938	0	2451	1	2964	1
400	0	913	0	1426	1	1939	0	2452	0	2965	0
401	0	914	0	1427	0	1940	0	2453	1	2966	1
402	1	915	0	1428	0	1941	0	2454	0	2967	1
403	0	916	1	1429	0	1942	1	2455	1	2968	1
404	0	917	1	1430	1	1943	0	2456	1	2969	1
405	1	918	1	1431	0	1944	1	2457	0	2970	0
406	1	919	0	1432	1	1945	0	2458	0	2971	0
407	1	920	1	1433	1	1946	1	2459	1	2972	1
408	0	921	0	1434	0	1947	1	2460	1	2973	0
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423	1	936	1	1449	1	1962	1	2475	0	2988	1
424	0	937	0	1450	1	1963	1	2476	1	2989	0
425	0	938	0	1451	1	1964	1	2477	0	2990	0
426	1	939	0	1452	0	1965	0	2478	0	2991	0
427	0	940	1	1453	0	1966	1	2479	1	2992	1
428	0	941	0	1454	1	1967	1	2480	1	2993	1
429	1	942	0	1455	0	1968	0	2481	0	2994	0
430	0	943	0	1456	0	1969	1	2482	1	2995	0
431	1	944	0	1457	1	1970	1	2483	1	2996	1

432	1	945	1	1458	0	1971	0	2484	0	2997	1
433	1	946	0	1459	1	1972	0	2485	0	2998	1
434	1	947	0	1460	1	1973	1	2486	0	2999	0
435	0	948	0	1461	1	1974	1	2487	0	3000	0
436	0	949	0	1462	1	1975	1	2488	0	3001	0
437	1	950	0	1463	1	1976	1	2489	0	3002	1
438	0	951	0	1464	1	1977	0	2490	1	3003	1
439	1	952	1	1465	0	1978	1	2491	0	3004	0
440	1	953	0	1466	1	1979	1	2492	1	3005	0
441	0	954	1	1467	0	1980	0	2493	0	3006	1
442	0	955	0	1468	0	1981	1	2494	0	3007	1
443	1	956	0	1469	0	1982	1	2495	0	3008	1
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446	0	959	1	1472	1	1985	1	2498	0	3011	1
447	1	960	1	1473	0	1986	0	2499	1	3012	0
448	1	961	1	1474	1	1987	0	2500	1	3013	0
449	1	962	1	1475	0	1988	0	2501	0	3014	1
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454	0	967	0	1480	1	1993	0	2506	1	3019	1
455	0	968	1	1481	0	1994	0	2507	0	3020	1
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467	0	980	1	1493	0	2006	1	2519	1	3032	0
468	0	981	1	1494	0	2007	1	2520	0	3033	1
469	1	982	0	1495	1	2008	0	2521	0	3034	0
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490	0	1003	0	1516	0	2029	0	2542	0	3055	1
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511	0	1024	1	1537	0	2050	0	2563	0		
512	1	1025	0	1538	1	2051	0	2564	0		

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