PROOF OF THE CONTINUED FRACTION CONJECTURE FOR $(a,b)=(z,z^6+z^2+z)$

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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 $(a,b)=(z,z^6+z^2+z)$.

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 $(a,b) = (z, z^6 + z^2 + z)$, the two power series* $\mathrm{CF}(a,b)$ *and* $\mathrm{CF}(b,a)$ *are algebraic over $\mathbb{F}_2(z)$, with minimal polynomials of the form*

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

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

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

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

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

2. Proof

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

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

By the basic properties of continued fractions, we have

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

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

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

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

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

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

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

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

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

for some positive integer d_n. Hence,

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

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

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

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

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

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 $n \ge 0$. If for some $n \ge 0$ and $a_0, a_1, \ldots, a_{n-1} \in \mathbb{F}_2$ $P(x, \sum_{j=0}^{n-1} a_j x^j) = O(x^n)$ and $Q(x,y) := P(x, \sum_{j=0}^{n-1} a_j x^j + x^n y)$ can be written as $x^m \sum_{j=0}^{\infty} q_j(x) y^j$ where $q_j(x)$ are polynomials for $j \ge 0$, $q_1(0) = 1$, and $q_j(0) = 0$ for $j > 1$, then there exists a unique solution $f(x) \in \mathbb{F}_2[[x]]$ of $P(x, f(x)) = 0$ that satisfies the initial condition $f_n(x) = \sum_{j=0}^{n-1} a_j x^j$.

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

Lemma 2.1. *We have*

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

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

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

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

Proof. We give the proof of the identity

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

the proofs of the others being similar.

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

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

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

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

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

$$\begin{aligned}
M^e[:14u] = {} & M^e[:7u] + x^{2u}M^e[:5u] + x^{5u}M^e[:2u] + x^{2u}M^e[:7u] + x^{4u}M^e[:5u] \\
& + x^{7u}M^e[:2u] + x^{4u}M^e[:7u] + x^{6u}M^e[:5u] + x^{9u}M^e[:2u] \\
& + x^{5u}M^e[:7u] + x^{7u}M^e[:5u] + x^{10u}M^e[:2u] + x^{6u}M^e[:7u] \\
& + x^{8u}M^e[:5u] + x^{11u}M^e[:2u] + x^{7u}M^e[:7u] + x^{9u}M^e[:5u] \\
& + x^{10u}M^e[:4u] + (x^{7u}+x^{9u}+x^{11u}+x^{12u}+x^{13u})R^e, \\
W^e[:14u] = {} & W^e[:7u] + x^{2u}W^e[:5u] + x^{5u}W^e[:2u] + x^{2u}W^e[:7u] + x^{4u}W^e[:5u]
\end{aligned}$$

$$
\begin{aligned}
&+ x^{7u}W^e[:2u] + x^{4u}W^e[:7u] + x^{6u}W^e[:5u] + x^{9u}W^e[:2u] \\
&+ x^{5u}W^e[:7u] + x^{7u}W^e[:5u] + x^{10u}W^e[:2u] + x^{6u}W^e[:7u] \\
&+ x^{8u}W^e[:5u] + x^{11u}W^e[:2u] + x^{7u}W^e[:7u] + x^{9u}W^e[:5u] \\
&+ x^{10u}W^e[:4u] + (x^{7u} + x^{9u} + x^{11u} + x^{12u} + x^{13u})R^e.
\end{aligned}
$$

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

$$
\begin{aligned}
M^o[:14u] = {}& M^o[:7u] + x^{2u}M^o[:5u] + x^{5u}M^o[:2u] + x^{2u}M^o[:7u] + x^{4u}M^o[:5u] \\
&+ x^{7u}M^o[:2u] + x^{4u}M^o[:7u] + x^{6u}M^o[:5u] + x^{9u}M^o[:2u] \\
&+ x^{5u}M^o[:7u] + x^{7u}M^o[:5u] + x^{10u}M^o[:2u] + x^{6u}M^o[:7u] \\
&+ x^{8u}M^o[:5u] + x^{11u}M^o[:2u] + x^{7u}M^o[:7u] + x^{9u}M^o[:5u] \\
&+ x^{10u}M^o[:4u] + (x^{7u} + x^{9u} + x^{11u} + x^{12u} + x^{13u})R^o, \\
W^o[:14u] = {}& W^o[:7u] + x^{2u}W^o[:5u] + x^{5u}W^o[:2u] + x^{2u}W^o[:7u] + x^{4u}W^o[:5u] \\
&+ x^{7u}W^o[:2u] + x^{4u}W^o[:7u] + x^{6u}W^o[:5u] + x^{9u}W^o[:2u] \\
&+ x^{5u}W^o[:7u] + x^{7u}W^o[:5u] + x^{10u}W^o[:2u] + x^{6u}W^o[:7u] \\
&+ x^{8u}W^o[:5u] + x^{11u}W^o[:2u] + x^{7u}W^o[:7u] + x^{9u}W^o[:5u] \\
&+ x^{10u}W^o[:4u] + (x^{7u} + x^{9u} + x^{11u} + x^{12u} + x^{13u})R^o.
\end{aligned}
$$

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 $u = 2^{2k}$,

$$
\begin{aligned}
T[:14u] = {}& T[:7u] + x^{2u}T[:5u] + x^{5u}T[:2u] + x^{2u}T[:7u] + x^{4u}T[:5u] + x^{7u}T[:2u] \\
&+ x^{4u}T[:7u] + x^{6u}T[:5u] + x^{9u}T[:2u] + x^{5u}T[:7u] + x^{7u}T[:5u] \\
&+ x^{10u}T[:2u] + x^{6u}T[:7u] + x^{8u}T[:5u] + x^{11u}T[:2u] + x^{7u}T[:7u] \\
&+ x^{9u}T[:5u] + x^{10u}T[:4u].
\end{aligned}
$$

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

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

which can be rewritten as

$$0 = T[[w]_2] + T[[10w]_2] + T[[101w]_2] + T[[111w]_2], \tag{2.7}$$

$$0 = T[[w]_2] + T[[1w]_2] + T[[11w]_2] + T[[110w]_2] + T[[1000w]_2], \tag{2.8}$$

$$0 = T[[1w]_2] + T[[100w]_2] + T[[101w]_2] + T[[1001w]_2], \tag{2.9}$$

$$0 = T[[10w]_2] + T[[101w]_2] + T[[110w]_2] + T[[1010w]_2], \tag{2.10}$$

$$\begin{aligned} 0 = {} & T[[w]_2] + T[[10w]_2] + T[[11w]_2] + T[[101w]_2] + T[[110w]_2] \\ & + T[[1011w]_2], \end{aligned} \tag{2.11}$$

$$\begin{aligned} 0 = {} & T[[1w]_2] + T[[10w]_2] + T[[11w]_2] + T[[100w]_2] + T[[101w]_2] \\ & + T[[110w]_2] + T[[1100w]_2], \end{aligned} \tag{2.12}$$

$$0 = T[[11w]_2] + T[[100w]_2] + T[[110w]_2] + T[[1101w]_2], \tag{2.13}$$

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

$$0 = T[[w]_2] + T[[10w]_2] + T[[101w]_2] + T[[111w]_2], \tag{2.14}$$

$$0 = T[[w]_2] + T[[1w]_2] + T[[11w]_2] + T[[110w]_2] + T[[1000w]_2], \tag{2.15}$$

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

$$0 = T[[10w]_2] + T[[101w]_2] + T[[110w]_2] + T[[1010w]_2], \tag{2.17}$$

$$\begin{aligned} 0 = {} & T[[w]_2] + T[[10w]_2] + T[[11w]_2] + T[[101w]_2] + T[[110w]_2] \\ & + T[[1011w]_2], \end{aligned} \tag{2.18}$$

$$\begin{aligned} 0 = {} & T[[1w]_2] + T[[10w]_2] + T[[11w]_2] + T[[100w]_2] + T[[101w]_2] \\ & + T[[110w]_2] + T[[1100w]_2], \end{aligned} \tag{2.19}$$

$$0 = T[[11w]_2] + T[[100w]_2] + T[[110w]_2] + T[[1101w]_2], \tag{2.20}$$

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

First we calculate an 2-automaton that generates T from its minimal polynomial and its first terms. This automaton has 2882 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

$$0 = \tau(A(s, \epsilon)) + \tau(A(s, 10)) + \tau(A(s, 101)) + \tau(A(s, 111)), \tag{2.21}$$

$$\begin{aligned} 0 = {} & \tau(A(s, \epsilon)) + \tau(A(s, 1)) + \tau(A(s, 11)) + \tau(A(s, 110)) \\ & + \tau(A(s, 1000)), \end{aligned} \tag{2.22}$$

$$0 = \tau(A(s, 1)) + \tau(A(s, 100)) + \tau(A(s, 101)) + \tau(A(s, 1001)), \tag{2.23}$$

$$0 = \tau(A(s, 10)) + \tau(A(s, 101)) + \tau(A(s, 110)) + \tau(A(s, 1010)), \tag{2.24}$$

$$\begin{aligned} 0 = {} & \tau(A(s, \epsilon)) + \tau(A(s, 10)) + \tau(A(s, 11)) + \tau(A(s, 101)) \\ & + \tau(A(s, 110)) + \tau(A(s, 1011)), \end{aligned} \tag{2.25}$$

$$\begin{aligned} 0 = {} & \tau(A(s, 1)) + \tau(A(s, 10)) + \tau(A(s, 11)) + \tau(A(s, 100)) \\ & + \tau(A(s, 101)) + \tau(A(s, 110)) + \tau(A(s, 1100)), \end{aligned} \tag{2.26}$$

$$0 = \tau(A(s, 11)) + \tau(A(s, 100)) + \tau(A(s, 110)) + \tau(A(s, 1101)), \tag{2.27}$$

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

$$0 = \tau(A(s, \epsilon)) + \tau(A(s, 10)) + \tau(A(s, 101)) + \tau(A(s, 111)), \tag{2.28}$$

$$\begin{aligned}
0 &= \tau(A(s,\epsilon)) + \tau(A(s,1)) + \tau(A(s,11)) + \tau(A(s,110)) \\
&\quad + \tau(A(s,1000)), \qquad (2.29)
\end{aligned}$$

$$0 = \tau(A(s,1)) + \tau(A(s,100)) + \tau(A(s,101)) + \tau(A(s,1001)), \qquad (2.30)$$

$$0 = \tau(A(s,10)) + \tau(A(s,101)) + \tau(A(s,110)) + \tau(A(s,1010)), \qquad (2.31)$$

$$\begin{aligned}
0 &= \tau(A(s,\epsilon)) + \tau(A(s,10)) + \tau(A(s,11)) + \tau(A(s,101)) \\
&\quad + \tau(A(s,110)) + \tau(A(s,1011)), \qquad (2.32)
\end{aligned}$$

$$\begin{aligned}
0 &= \tau(A(s,1)) + \tau(A(s,10)) + \tau(A(s,11)) + \tau(A(s,100)) \\
&\quad + \tau(A(s,101)) + \tau(A(s,110)) + \tau(A(s,1100)), \qquad (2.33)
\end{aligned}$$

$$0 = \tau(A(s,11)) + \tau(A(s,100)) + \tau(A(s,110)) + \tau(A(s,1101)), \qquad (2.34)$$

for $s = A(i, 0^{2k})$. We find that $(A(i, 0^{44}), E_{44}) = (A(i, 0^{20}), E_{20})$, so that we only have to verify that identities (2.21) through (2.34) hold for $2 \le k \le 22$, which turns out to be true. $\square$

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

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

$$\begin{aligned}
M_{2k} &= M^e[:7u] + x^{2u} M^e[:5u] + x^{5u} M^e[:2u] + x^{7u} R^e, \\
W_{2k} &= W^e[:7u] + x^{2u} W^e[:5u] + x^{5u} W^e[:2u] + x^{7u} R^e.
\end{aligned}$$

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

$$\begin{aligned}
M_{2k+1} &= M^o[:7u] + x^{2u} M^o[:5u] + x^{5u} M^o[:2u] + x^{7u} R^o, \\
W_{2k+1} &= W^o[:7u] + x^{2u} W^o[:5u] + x^{5u} W^o[:2u] + x^{7u} R^o.
\end{aligned}$$

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

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

We give the proof of

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

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

$$\begin{aligned}
W_{2k} M_{2k} &= \left(W^e[:7v] + x^{2v} W^e[:5v] + x^{5v} W^e[:2v] + x^{7u} R^e\right) \times \left(M^e[:7v]\right. \\
&\quad \left. + x^{2v} M^e[:5v] + x^{5v} M^e[:2v] + x^{7u} R^e\right); \qquad (2.35)
\end{aligned}$$

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

$$W^e[:14v] M^e[:14v] + x^{4v} W^e[:10v] M^e[:10v] + x^{10v} W^e[:4v] M^e[:4v].$$

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

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

Using the notation introduced above, we can represent the expressions lhs (2.35) and rhs as polynomials in $\mathbb{F}_2[a_1,\ldots,a_{14},b_1,\ldots,b_{14},c][X]$. 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

$$\begin{aligned}
q_0(x) &= x^{22}+x^{19}+x^{15}+x^{13}+x^{12}+x^{11}+x^9+x^7+x^4, \\
q_1(x) &= x^{18}+x^{17}+x^{14}+x^{12}+x^{11}+x^{10}+x^8+x^6+x^3+x, \\
q_2(x) &= x^{18}+x^{16}+x^{12}+x^2+1, \\
q_3(x) &= x^{18}+x^{17}+x^{14}+x^{12}+x^{11}+x^{10}+x^8+x^6+x^3+x, \\
q_4(x) &= x^{22}+x^{19}+x^{18}+x^{15}+x^{13}+x^{11}+x^9+x^7+x^2.
\end{aligned}$$

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

3. Annexe

All 16 polynomials are of the form

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

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

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

$$\begin{aligned}
p_0(x) &= x^{132} + x^{126} + x^{124} + x^{120} + x^{118} + x^{116} + x^{112} + x^{108} + x^{104} + x^{102} \\
&\quad + x^{98} + x^{92} + x^{82} + x^{80} + x^{76} + x^{58} + x^{56} + x^{52} + x^{48} + x^{44} + x^{42} \\
&\quad + x^{40} + x^{38} + x^{34} + x^{32} + x^{30} + x^{26} + x^{22} + x^{12}, \\
p_3(x) &= x^{116} + x^{114} + x^{112} + x^{110} + x^{108} + x^{94} + x^{90} + x^{88} + x^{86} + x^{84} + x^{76} \\
&\quad + x^{70} + x^{68} + x^{64} + x^{60} + x^{58} + x^{54} + x^{50} + x^{46} + x^{38} + x^{36} + x^{30} \\
&\quad + x^{20} + x^{8}, \\
p_6(x) &= x^{114} + x^{112} + x^{110} + x^{106} + x^{102} + x^{100} + x^{92} + x^{90} + x^{88} + x^{84} \\
&\quad + x^{72} + x^{70} + x^{68} + x^{62} + x^{58} + x^{54} + x^{48} + x^{46} + x^{44} + x^{42} + x^{22} \\
&\quad + x^{20} + x^{18} + x^{14} + x^{10} + x^{4} + x^{2} + 1, \\
p_9(x) &= x^{106} + x^{100} + x^{98} + x^{94} + x^{88} + x^{86} + x^{82} + x^{78} + x^{76} + x^{74} + x^{72} \\
&\quad + x^{66} + x^{64} + x^{60} + x^{56} + x^{54} + x^{52} + x^{50} + x^{42} + x^{36} + x^{34} + x^{30} \\
&\quad + x^{24} + x^{22} + x^{14} + x^{10} + x^{8} + x^{6} + x^{4} + x^{2}, \\
p_{12}(x) &= x^{104} + x^{96} + x^{64} + x^{56} + x^{48} + x^{40} + x^{32} + x^{16} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{117} + x^{116} + x^{112} + x^{111} + x^{108} + x^{106} + x^{100} + x^{99} + x^{98} + x^{96} \\
&\quad + x^{90} + x^{88} + x^{87} + x^{85} + x^{83} + x^{82} + x^{81} + x^{79} + x^{78} + x^{77} + x^{76} \\
&\quad + x^{75} + x^{74} + x^{73} + x^{72} + x^{69} + x^{68} + x^{66} + x^{65} + x^{62} + x^{61} + x^{60} \\
&\quad + x^{58} + x^{57} + x^{55} + x^{51} + x^{50} + x^{47} + x^{45} + x^{41} + x^{40} + x^{39} + x^{37} \\
&\quad + x^{35} + x^{32} + x^{31} + x^{30} + x^{29} + x^{28} + x^{27} + x^{26} + x^{25} + x^{24} + x^{23} \\
&\quad + x^{22} + x^{21} + x^{18}, \\
p_3(x) &= x^{95} + x^{93} + x^{91} + x^{85} + x^{79} + x^{77} + x^{75} + x^{73} + x^{71} + x^{69} + x^{67} \\
&\quad + x^{61} + x^{55} + x^{53} + x^{51} + x^{49} + x^{39} + x^{37} + x^{35} + x^{31} + x^{27} + x^{23} \\
&\quad + x^{19} + x^{17} + x^{15} + x^{13} + x^{11} + x^{9}, \\
p_6(x) &= x^{93} + x^{92} + x^{91} + x^{90} + x^{88} + x^{86} + x^{85} + x^{84} + x^{81} + x^{79} + x^{78} \\
&\quad + x^{76} + x^{75} + x^{73} + x^{72} + x^{70} + x^{69} + x^{67} + x^{66} + x^{65} + x^{62} + x^{61} \\
&\quad + x^{56} + x^{55} + x^{54} + x^{51} + x^{46} + x^{37} + x^{36} + x^{35} + x^{34} + x^{32} + x^{30} \\
&\quad + x^{27} + x^{26} + x^{25} + x^{24} + x^{23} + x^{21} + x^{19} + x^{16} + x^{15} + x^{11} + x^{6},
\end{aligned}$$

$$\begin{aligned}
p_9(x) &= x^{91}+x^{85}+x^{83}+x^{79}+x^{73}+x^{65}+x^{63}+x^{55}+x^{49}+x^{47}+x^{39}\\
&\quad +x^{33}+x^{31}+x^{27}+x^{21}+x^{13}+x^{5}+x^{3},\\
p_{12}(x) &= x^{89}+x^{88}+x^{85}+x^{80}+x^{69}+x^{68}+x^{64}+x^{41}+x^{40}+x^{37}+x^{32}\\
&\quad +x^{25}+x^{24}+x^{20}+x^{5}+x^{4}+1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{117}+x^{116}+x^{112}+x^{111}+x^{108}+x^{106}+x^{100}+x^{99}+x^{98}+x^{96}\\
&\quad +x^{90}+x^{88}+x^{87}+x^{85}+x^{83}+x^{82}+x^{81}+x^{79}+x^{78}+x^{77}+x^{76}\\
&\quad +x^{75}+x^{74}+x^{73}+x^{72}+x^{69}+x^{68}+x^{66}+x^{65}+x^{62}+x^{61}+x^{60}\\
&\quad +x^{58}+x^{57}+x^{55}+x^{51}+x^{50}+x^{47}+x^{45}+x^{41}+x^{40}+x^{39}+x^{37}\\
&\quad +x^{35}+x^{32}+x^{31}+x^{30}+x^{29}+x^{28}+x^{27}+x^{26}+x^{25}+x^{24}+x^{23}\\
&\quad +x^{22}+x^{21}+x^{18},\\
p_3(x) &= x^{95}+x^{93}+x^{91}+x^{85}+x^{79}+x^{77}+x^{75}+x^{73}+x^{71}+x^{69}+x^{67}\\
&\quad +x^{61}+x^{55}+x^{53}+x^{51}+x^{49}+x^{39}+x^{37}+x^{35}+x^{31}+x^{27}+x^{23}\\
&\quad +x^{19}+x^{17}+x^{15}+x^{13}+x^{11}+x^{9},\\
p_6(x) &= x^{93}+x^{92}+x^{91}+x^{90}+x^{88}+x^{86}+x^{85}+x^{84}+x^{81}+x^{79}+x^{78}\\
&\quad +x^{76}+x^{75}+x^{73}+x^{72}+x^{70}+x^{69}+x^{67}+x^{66}+x^{65}+x^{62}+x^{61}\\
&\quad +x^{56}+x^{55}+x^{54}+x^{51}+x^{46}+x^{37}+x^{36}+x^{35}+x^{34}+x^{32}+x^{30}\\
&\quad +x^{27}+x^{26}+x^{25}+x^{24}+x^{23}+x^{21}+x^{19}+x^{16}+x^{15}+x^{11}+x^{6},\\
p_9(x) &= x^{91}+x^{85}+x^{83}+x^{79}+x^{73}+x^{65}+x^{63}+x^{55}+x^{49}+x^{47}+x^{39}\\
&\quad +x^{33}+x^{31}+x^{27}+x^{21}+x^{13}+x^{5}+x^{3},\\
p_{12}(x) &= x^{89}+x^{88}+x^{85}+x^{80}+x^{69}+x^{68}+x^{64}+x^{41}+x^{40}+x^{37}+x^{32}\\
&\quad +x^{25}+x^{24}+x^{20}+x^{5}+x^{4}+1,
\end{aligned}$$

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

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

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

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

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

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

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

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

$$\begin{aligned}
p_0(x) &= x^{117} + x^{116} + x^{113} + x^{110} + x^{107} + x^{106} + x^{105} + x^{104} + x^{101} + x^{98} \\
&\quad + x^{96} + x^{93} + x^{92} + x^{90} + x^{89} + x^{85} + x^{84} + x^{83} + x^{82} + x^{78} + x^{76} \\
&\quad + x^{75} + x^{74} + x^{72} + x^{70} + x^{69} + x^{64} + x^{61} + x^{56} + x^{55} + x^{54} + x^{53} \\
&\quad + x^{51} + x^{49} + x^{47} + x^{46} + x^{43} + x^{40} + x^{39} + x^{38} + x^{36} + x^{34} + x^{32} \\
&\quad + x^{31} + x^{27}, \\
p_3(x) &= x^{95} + x^{93} + x^{91} + x^{85} + x^{79} + x^{77} + x^{75} + x^{73} + x^{71} + x^{69} + x^{67} \\
&\quad + x^{61} + x^{55} + x^{53} + x^{51} + x^{49} + x^{39} + x^{37} + x^{35} + x^{31} + x^{27} + x^{23} \\
&\quad + x^{19} + x^{17} + x^{15} + x^{13} + x^{11} + x^{9}, \\
p_6(x) &= x^{93} + x^{92} + x^{91} + x^{90} + x^{88} + x^{86} + x^{85} + x^{84} + x^{81} + x^{79} + x^{78} \\
&\quad + x^{76} + x^{75} + x^{73} + x^{72} + x^{70} + x^{69} + x^{67} + x^{66} + x^{65} + x^{62} + x^{61} \\
&\quad + x^{56} + x^{55} + x^{54} + x^{51} + x^{46} + x^{37} + x^{36} + x^{35} + x^{34} + x^{32} + x^{30} \\
&\quad + x^{27} + x^{26} + x^{25} + x^{24} + x^{23} + x^{21} + x^{19} + x^{16} + x^{15} + x^{11} + x^{6}, \\
p_9(x) &= x^{91} + x^{85} + x^{83} + x^{79} + x^{73} + x^{65} + x^{63} + x^{55} + x^{49} + x^{47} + x^{39} \\
&\quad + x^{33} + x^{31} + x^{27} + x^{21} + x^{13} + x^{5} + x^{3}, \\
p_{12}(x) &= x^{89} + x^{88} + x^{85} + x^{80} + x^{69} + x^{68} + x^{64} + x^{41} + x^{40} + x^{37} + x^{32} \\
&\quad + x^{25} + x^{24} + x^{20} + x^{5} + x^{4} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{117} + x^{116} + x^{113} + x^{110} + x^{107} + x^{106} + x^{105} + x^{104} + x^{101} + x^{98} \\
&\quad + x^{96} + x^{93} + x^{92} + x^{90} + x^{89} + x^{85} + x^{84} + x^{83} + x^{82} + x^{78} + x^{76} \\
&\quad + x^{75} + x^{74} + x^{72} + x^{70} + x^{69} + x^{64} + x^{61} + x^{56} + x^{55} + x^{54} + x^{53} \\
&\quad + x^{51} + x^{49} + x^{47} + x^{46} + x^{43} + x^{40} + x^{39} + x^{38} + x^{36} + x^{34} + x^{32} \\
&\quad + x^{31} + x^{27},
\end{aligned}$$

$$\begin{aligned}
p_3(x) &= x^{95} + x^{93} + x^{91} + x^{85} + x^{79} + x^{77} + x^{75} + x^{73} + x^{71} + x^{69} + x^{67} \\
&\quad + x^{61} + x^{55} + x^{53} + x^{51} + x^{49} + x^{39} + x^{37} + x^{35} + x^{31} + x^{27} + x^{23} \\
&\quad + x^{19} + x^{17} + x^{15} + x^{13} + x^{11} + x^{9}, \\
p_6(x) &= x^{93} + x^{92} + x^{91} + x^{90} + x^{88} + x^{86} + x^{85} + x^{84} + x^{81} + x^{79} + x^{78} \\
&\quad + x^{76} + x^{75} + x^{73} + x^{72} + x^{70} + x^{69} + x^{67} + x^{66} + x^{65} + x^{62} + x^{61} \\
&\quad + x^{56} + x^{55} + x^{54} + x^{51} + x^{46} + x^{37} + x^{36} + x^{35} + x^{34} + x^{32} + x^{30} \\
&\quad + x^{27} + x^{26} + x^{25} + x^{24} + x^{23} + x^{21} + x^{19} + x^{16} + x^{15} + x^{11} + x^{6}, \\
p_9(x) &= x^{91} + x^{85} + x^{83} + x^{79} + x^{73} + x^{65} + x^{63} + x^{55} + x^{49} + x^{47} + x^{39} \\
&\quad + x^{33} + x^{31} + x^{27} + x^{21} + x^{13} + x^{5} + x^{3}, \\
p_{12}(x) &= x^{89} + x^{88} + x^{85} + x^{80} + x^{69} + x^{68} + x^{64} + x^{41} + x^{40} + x^{37} + x^{32} \\
&\quad + x^{25} + x^{24} + x^{20} + x^{5} + x^{4} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{132} + x^{128} + x^{126} + x^{124} + x^{116} + x^{112} + x^{106} + x^{102} + x^{98} + x^{96} \\
&\quad + x^{90} + x^{82} + x^{80} + x^{78} + x^{74} + x^{70} + x^{66} + x^{62} + x^{60} + x^{58} + x^{52} \\
&\quad + x^{46} + x^{42}, \\
p_3(x) &= x^{116} + x^{114} + x^{108} + x^{102} + x^{94} + x^{90} + x^{84} + x^{78} + x^{76} + x^{72} + x^{68} \\
&\quad + x^{60} + x^{58} + x^{50} + x^{48} + x^{36} + x^{30} + x^{20} + x^{16} + x^{14} + x^{8} + x^{6}, \\
p_6(x) &= x^{114} + x^{112} + x^{108} + x^{106} + x^{104} + x^{96} + x^{92} + x^{90} + x^{86} + x^{78} + x^{76} \\
&\quad + x^{72} + x^{64} + x^{62} + x^{58} + x^{52} + x^{48} + x^{42} + x^{40} + x^{38} + x^{36} + x^{32} \\
&\quad + x^{24} + x^{22} + x^{20} + x^{18} + x^{16} + x^{12} + x^{10} + x^{6} + x^{2} + 1, \\
p_9(x) &= x^{106} + x^{100} + x^{98} + x^{94} + x^{88} + x^{86} + x^{82} + x^{78} + x^{76} + x^{74} + x^{72} \\
&\quad + x^{66} + x^{64} + x^{60} + x^{56} + x^{54} + x^{52} + x^{50} + x^{42} + x^{36} + x^{34} + x^{30} \\
&\quad + x^{24} + x^{22} + x^{14} + x^{10} + x^{8} + x^{6} + x^{4} + x^{2}, \\
p_{12}(x) &= x^{104} + x^{96} + x^{64} + x^{56} + x^{48} + x^{40} + x^{32} + x^{16} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{117} + x^{116} + x^{115} + x^{114} + x^{111} + x^{110} + x^{109} + x^{107} + x^{104} + x^{102} \\
&\quad + x^{101} + x^{96} + x^{95} + x^{94} + x^{93} + x^{92} + x^{90} + x^{89} + x^{87} + x^{80} + x^{79} \\
&\quad + x^{78} + x^{77} + x^{76} + x^{73} + x^{72} + x^{70} + x^{66} + x^{65} + x^{63} + x^{62} + x^{58} \\
&\quad + x^{57} + x^{54} + x^{50} + x^{48} + x^{47} + x^{46} + x^{44} + x^{43} + x^{40} + x^{39} + x^{37} \\
&\quad + x^{36} + x^{31} + x^{30} + x^{29} + x^{27} + x^{26} + x^{25} + x^{24} + x^{20} + x^{17} + x^{14} \\
&\quad + x^{12}, \\
p_3(x) &= x^{101} + x^{100} + x^{99} + x^{98} + x^{97} + x^{96} + x^{95} + x^{94} + x^{93} + x^{92} + x^{90} \\
&\quad + x^{89} + x^{87} + x^{85} + x^{83} + x^{76} + x^{74} + x^{73} + x^{71} + x^{67} + x^{65} + x^{64}
\end{aligned}$$

$$+ x^{63} + x^{62} + x^{61} + x^{58} + x^{54} + x^{52} + x^{50} + x^{43} + x^{42} + x^{41} + x^{39}$$
$$+ x^{38} + x^{37} + x^{36} + x^{35} + x^{30} + x^{29} + x^{27} + x^{26} + x^{25} + x^{24} + x^{23}$$
$$+ x^{21} + x^{20} + x^{14} + x^{13} + x^{10} + x^{8},$$

$$\begin{aligned}
p_6(x) &= x^{97} + x^{96} + x^{95} + x^{94} + x^{93} + x^{92} + x^{91} + x^{90} + x^{86} + x^{85} + x^{84}\\
&\quad + x^{82} + x^{78} + x^{77} + x^{76} + x^{74} + x^{73} + x^{72} + x^{71} + x^{70} + x^{67} + x^{66}\\
&\quad + x^{65} + x^{62} + x^{60} + x^{59} + x^{58} + x^{57} + x^{54} + x^{52} + x^{51} + x^{48} + x^{46}\\
&\quad + x^{42} + x^{41} + x^{40} + x^{39} + x^{34} + x^{33} + x^{31} + x^{27} + x^{26} + x^{25} + x^{24}\\
&\quad + x^{22} + x^{20} + x^{19} + x^{17} + x^{16} + x^{14} + x^{13} + x^{9} + x^{8} + x^{6} + x^{5} + 1,\\
p_9(x) &= x^{89} + x^{88} + x^{84} + x^{73} + x^{72} + x^{68} + x^{41} + x^{40} + x^{36} + x^{9} + x^{8} + x^{4},\\
p_{12}(x) &= x^{85} + x^{84} + x^{80} + x^{73} + x^{72} + x^{69} + x^{64} + x^{37} + x^{36} + x^{32} + x^{25}\\
&\quad + x^{24} + x^{20} + x^{9} + x^{8} + x^{5} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{112} + x^{110} + x^{108} + x^{107} + x^{106} + x^{105} + x^{104} + x^{103} + x^{102} + x^{100}\\
&\quad + x^{96} + x^{95} + x^{94} + x^{93} + x^{92} + x^{90} + x^{88} + x^{87} + x^{84} + x^{82} + x^{81}\\
&\quad + x^{79} + x^{76} + x^{73} + x^{72} + x^{69} + x^{68} + x^{66} + x^{64} + x^{61} + x^{58} + x^{57}\\
&\quad + x^{56} + x^{55} + x^{53} + x^{52} + x^{51} + x^{50} + x^{49} + x^{44} + x^{36} + x^{35} + x^{33}\\
&\quad + x^{29} + x^{27} + x^{26} + x^{23} + x^{22} + x^{21} + x^{20} + x^{18},\\
p_3(x) &= x^{92} + x^{91} + x^{90} + x^{89} + x^{88} + x^{86} + x^{83} + x^{82} + x^{78} + x^{73} + x^{68}\\
&\quad + x^{67} + x^{66} + x^{65} + x^{64} + x^{62} + x^{59} + x^{58} + x^{54} + x^{49} + x^{36} + x^{35}\\
&\quad + x^{34} + x^{33} + x^{32} + x^{30} + x^{28} + x^{25} + x^{24} + x^{19} + x^{18} + x^{17} + x^{14}\\
&\quad + x^{9},\\
p_6(x) &= x^{88} + x^{86} + x^{80} + x^{76} + x^{74} + x^{70} + x^{68} + x^{64} + x^{62} + x^{60} + x^{56}\\
&\quad + x^{50} + x^{46} + x^{32} + x^{30} + x^{22} + x^{20} + x^{18} + x^{16} + x^{14} + x^{10} + x^{6},\\
p_9(x) &= x^{84} + x^{83} + x^{80} + x^{76} + x^{72} + x^{67} + x^{36} + x^{35} + x^{32} + x^{28} + x^{24}\\
&\quad + x^{20} + x^{16} + x^{12} + x^{8} + x^{3},\\
p_{12}(x) &= x^{80} + x^{68} + x^{64} + x^{32} + x^{20} + x^{4} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{132} + x^{130} + x^{127} + x^{126} + x^{125} + x^{122} + x^{121} + x^{119} + x^{118} + x^{116}\\
&\quad + x^{110} + x^{109} + x^{108} + x^{107} + x^{106} + x^{105} + x^{100} + x^{99} + x^{98} + x^{97}\\
&\quad + x^{96} + x^{93} + x^{89} + x^{88} + x^{85} + x^{81} + x^{80} + x^{79} + x^{78} + x^{77} + x^{76}\\
&\quad + x^{75} + x^{74} + x^{72} + x^{70} + x^{67} + x^{66} + x^{56} + x^{53} + x^{52} + x^{51} + x^{50}\\
&\quad + x^{49} + x^{46} + x^{43} + x^{42} + x^{40} + x^{39} + x^{37} + x^{36} + x^{35} + x^{29} + x^{27},\\
p_3(x) &= x^{112} + x^{111} + x^{110} + x^{109} + x^{107} + x^{105} + x^{104} + x^{103} + x^{99} + x^{94}
\end{aligned}$$

$$
\begin{aligned}
&+x^{93}+x^{92}+x^{91}+x^{90}+x^{87}+x^{85}+x^{82}+x^{81}+x^{80}+x^{79}+x^{78}\\
&+x^{75}+x^{73}+x^{70}+x^{69}+x^{68}+x^{67}+x^{66}+x^{64}+x^{62}+x^{59}+x^{58}\\
&+x^{56}+x^{55}+x^{53}+x^{51}+x^{46}+x^{45}+x^{41}+x^{40}+x^{39}+x^{38}+x^{37}\\
&+x^{36}+x^{34}+x^{32}+x^{29}+x^{28}+x^{24}+x^{19}+x^{18}+x^{17}+x^{14}+x^{9},\\
p_6(x)=&\,x^{108}+x^{106}+x^{104}+x^{102}+x^{100}+x^{94}+x^{92}+x^{82}+x^{80}+x^{78}+x^{76}\\
&+x^{74}+x^{72}+x^{68}+x^{64}+x^{60}+x^{56}+x^{52}+x^{48}+x^{42}+x^{40}+x^{30}\\
&+x^{20}+x^{18}+x^{16}+x^{14}+x^{10}+x^{6},\\
p_9(x)=&\,x^{104}+x^{103}+x^{99}+x^{88}+x^{87}+x^{84}+x^{80}+x^{76}+x^{72}+x^{67}+x^{56}\\
&+x^{55}+x^{51}+x^{36}+x^{35}+x^{32}+x^{28}+x^{23}+x^{20}+x^{19}+x^{16}+x^{12}\\
&+x^{8}+x^{3},\\
p_{12}(x)=&\,x^{100}+x^{96}+x^{88}+x^{68}+x^{64}+x^{52}+x^{48}+x^{40}+x^{36}+x^{32}+x^{24}\\
&+x^{20}+x^{16}+x^{4}+1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x)=&\,x^{117}+x^{116}+x^{115}+x^{114}+x^{108}+x^{107}+x^{106}+x^{103}+x^{99}+x^{98}\\
&+x^{97}+x^{94}+x^{93}+x^{91}+x^{89}+x^{88}+x^{87}+x^{85}+x^{84}+x^{83}+x^{81}\\
&+x^{78}+x^{76}+x^{75}+x^{73}+x^{69}+x^{68}+x^{65}+x^{64}+x^{63}+x^{61}+x^{60}\\
&+x^{58}+x^{57}+x^{56}+x^{54}+x^{53}+x^{52}+x^{51}+x^{50}+x^{47}+x^{46}+x^{44}\\
&+x^{42}+x^{41}+x^{37}+x^{36}+x^{35}+x^{33},\\
p_3(x)=&\,x^{101}+x^{100}+x^{99}+x^{98}+x^{97}+x^{96}+x^{87}+x^{85}+x^{84}+x^{83}+x^{79}\\
&+x^{78}+x^{77}+x^{73}+x^{72}+x^{70}+x^{69}+x^{68}+x^{67}+x^{66}+x^{64}+x^{63}\\
&+x^{62}+x^{61}+x^{60}+x^{58}+x^{55}+x^{53}+x^{48}+x^{43}+x^{42}+x^{41}+x^{35}\\
&+x^{34}+x^{33}+x^{31}+x^{27}+x^{24}+x^{22}+x^{20}+x^{18}+x^{16}+x^{15}+x^{12},\\
p_6(x)=&\,x^{97}+x^{96}+x^{95}+x^{94}+x^{93}+x^{92}+x^{89}+x^{88}+x^{84}+x^{82}+x^{80}\\
&+x^{79}+x^{75}+x^{74}+x^{73}+x^{71}+x^{64}+x^{61}+x^{60}+x^{59}+x^{58}+x^{55}\\
&+x^{53}+x^{52}+x^{42}+x^{39}+x^{36}+x^{35}+x^{33}+x^{31}+x^{30}+x^{29}+x^{28}\\
&+x^{25}+x^{23}+x^{22}+x^{20}+x^{15}+x^{14}+x^{11}+x^{8}+x^{5}+x^{4}+1,\\
p_9(x)=&\,x^{89}+x^{88}+x^{84}+x^{73}+x^{72}+x^{68}+x^{41}+x^{40}+x^{36}+x^{9}+x^{8}+x^{4},\\
p_{12}(x)=&\,x^{85}+x^{84}+x^{80}+x^{73}+x^{72}+x^{69}+x^{64}+x^{37}+x^{36}+x^{32}+x^{25}\\
&+x^{24}+x^{20}+x^{9}+x^{8}+x^{5}+1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x)=&\,x^{117}+x^{116}+x^{115}+x^{114}+x^{111}+x^{110}+x^{109}+x^{107}+x^{104}+x^{102}\\
&+x^{101}+x^{96}+x^{95}+x^{94}+x^{93}+x^{92}+x^{90}+x^{89}+x^{87}+x^{80}+x^{79}\\
&+x^{78}+x^{77}+x^{76}+x^{73}+x^{72}+x^{70}+x^{66}+x^{65}+x^{63}+x^{62}+x^{58}
\end{aligned}
$$

$$
\begin{aligned}
&+ x^{57} + x^{54} + x^{50} + x^{48} + x^{47} + x^{46} + x^{44} + x^{43} + x^{40} + x^{39} + x^{37}\\
&+ x^{36} + x^{31} + x^{30} + x^{29} + x^{27} + x^{26} + x^{25} + x^{24} + x^{20} + x^{17} + x^{14}\\
&+ x^{12},\\
p_3(x) &= x^{101} + x^{100} + x^{99} + x^{98} + x^{97} + x^{96} + x^{95} + x^{94} + x^{93} + x^{92} + x^{90}\\
&+ x^{89} + x^{87} + x^{85} + x^{83} + x^{76} + x^{74} + x^{73} + x^{71} + x^{67} + x^{65} + x^{64}\\
&+ x^{63} + x^{62} + x^{61} + x^{58} + x^{54} + x^{52} + x^{50} + x^{43} + x^{42} + x^{41} + x^{39}\\
&+ x^{38} + x^{37} + x^{36} + x^{35} + x^{30} + x^{29} + x^{27} + x^{26} + x^{25} + x^{24} + x^{23}\\
&+ x^{21} + x^{20} + x^{14} + x^{13} + x^{10} + x^{8},\\
p_6(x) &= x^{97} + x^{96} + x^{95} + x^{94} + x^{93} + x^{92} + x^{91} + x^{90} + x^{86} + x^{85} + x^{84}\\
&+ x^{82} + x^{78} + x^{77} + x^{76} + x^{74} + x^{73} + x^{72} + x^{71} + x^{70} + x^{67} + x^{66}\\
&+ x^{65} + x^{62} + x^{60} + x^{59} + x^{58} + x^{57} + x^{54} + x^{52} + x^{51} + x^{48} + x^{46}\\
&+ x^{42} + x^{41} + x^{40} + x^{39} + x^{34} + x^{33} + x^{31} + x^{27} + x^{26} + x^{25} + x^{24}\\
&+ x^{22} + x^{20} + x^{19} + x^{17} + x^{16} + x^{14} + x^{13} + x^{9} + x^{8} + x^{6} + x^{5} + 1,\\
p_9(x) &= x^{89} + x^{88} + x^{84} + x^{73} + x^{72} + x^{68} + x^{41} + x^{40} + x^{36} + x^{9} + x^{8} + x^{4},\\
p_{12}(x) &= x^{85} + x^{84} + x^{80} + x^{73} + x^{72} + x^{69} + x^{64} + x^{37} + x^{36} + x^{32} + x^{25}\\
&+ x^{24} + x^{20} + x^{9} + x^{8} + x^{5} + 1,
\end{aligned}
$$

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

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

$$
\begin{aligned}
p_0(x) &= x^{132} + x^{130} + x^{127} + x^{126} + x^{125} + x^{122} + x^{121} + x^{119} + x^{118} + x^{116}\\
&+ x^{110} + x^{109} + x^{108} + x^{107} + x^{106} + x^{105} + x^{100} + x^{99} + x^{98} + x^{97}\\
&+ x^{96} + x^{93} + x^{89} + x^{88} + x^{85} + x^{81} + x^{80} + x^{79} + x^{78} + x^{77} + x^{76}\\
&+ x^{75} + x^{74} + x^{72} + x^{70} + x^{67} + x^{66} + x^{56} + x^{53} + x^{52} + x^{51} + x^{50}\\
&+ x^{49} + x^{46} + x^{43} + x^{42} + x^{40} + x^{39} + x^{37} + x^{36} + x^{35} + x^{29} + x^{27},\\
p_3(x) &= x^{112} + x^{111} + x^{110} + x^{109} + x^{107} + x^{105} + x^{104} + x^{103} + x^{99} + x^{94}\\
&+ x^{93} + x^{92} + x^{91} + x^{90} + x^{87} + x^{85} + x^{82} + x^{81} + x^{80} + x^{79} + x^{78}\\
&+ x^{75} + x^{73} + x^{70} + x^{69} + x^{68} + x^{67} + x^{66} + x^{64} + x^{62} + x^{59} + x^{58}\\
&+ x^{56} + x^{55} + x^{53} + x^{51} + x^{46} + x^{45} + x^{41} + x^{40} + x^{39} + x^{38} + x^{37}\\
&+ x^{36} + x^{34} + x^{32} + x^{29} + x^{28} + x^{24} + x^{19} + x^{18} + x^{17} + x^{14} + x^{9},\\
p_6(x) &= x^{108} + x^{106} + x^{104} + x^{102} + x^{100} + x^{94} + x^{92} + x^{82} + x^{80} + x^{78} + x^{76}\\
&+ x^{74} + x^{72} + x^{68} + x^{64} + x^{60} + x^{56} + x^{52} + x^{48} + x^{42} + x^{40} + x^{30}\\
&+ x^{20} + x^{18} + x^{16} + x^{14} + x^{10} + x^{6},\\
p_9(x) &= x^{104} + x^{103} + x^{99} + x^{88} + x^{87} + x^{84} + x^{80} + x^{76} + x^{72} + x^{67} + x^{56}\\
&+ x^{55} + x^{51} + x^{36} + x^{35} + x^{32} + x^{28} + x^{23} + x^{20} + x^{19} + x^{16} + x^{12}\\
&+ x^{8} + x^{3},\\
p_{12}(x) &= x^{100} + x^{96} + x^{88} + x^{68} + x^{64} + x^{52} + x^{48} + x^{40} + x^{36} + x^{32} + x^{24}
\end{aligned}
$$

$$+ x^{20} + x^{16} + x^{4} + 1,$$

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

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

$$\begin{aligned}
p_0(x) &= x^{112} + x^{110} + x^{108} + x^{107} + x^{106} + x^{105} + x^{104} + x^{103} + x^{102} + x^{100} \\
&\quad + x^{96} + x^{95} + x^{94} + x^{93} + x^{92} + x^{90} + x^{88} + x^{87} + x^{84} + x^{82} + x^{81} \\
&\quad + x^{79} + x^{76} + x^{73} + x^{72} + x^{69} + x^{68} + x^{66} + x^{64} + x^{61} + x^{58} + x^{57} \\
&\quad + x^{56} + x^{55} + x^{53} + x^{52} + x^{51} + x^{50} + x^{49} + x^{44} + x^{36} + x^{35} + x^{33} \\
&\quad + x^{29} + x^{27} + x^{26} + x^{23} + x^{22} + x^{21} + x^{20} + x^{18}, \\
p_3(x) &= x^{92} + x^{91} + x^{90} + x^{89} + x^{88} + x^{86} + x^{83} + x^{82} + x^{78} + x^{73} + x^{68} \\
&\quad + x^{67} + x^{66} + x^{65} + x^{64} + x^{62} + x^{59} + x^{58} + x^{54} + x^{49} + x^{36} + x^{35} \\
&\quad + x^{34} + x^{33} + x^{32} + x^{30} + x^{28} + x^{25} + x^{24} + x^{19} + x^{18} + x^{17} + x^{14} \\
&\quad + x^{9}, \\
p_6(x) &= x^{88} + x^{86} + x^{80} + x^{76} + x^{74} + x^{70} + x^{68} + x^{64} + x^{62} + x^{60} + x^{56} \\
&\quad + x^{50} + x^{46} + x^{32} + x^{30} + x^{22} + x^{20} + x^{18} + x^{16} + x^{14} + x^{10} + x^{6}, \\
p_9(x) &= x^{84} + x^{83} + x^{80} + x^{76} + x^{72} + x^{67} + x^{36} + x^{35} + x^{32} + x^{28} + x^{24} \\
&\quad + x^{20} + x^{16} + x^{12} + x^{8} + x^{3}, \\
p_{12}(x) &= x^{80} + x^{68} + x^{64} + x^{32} + x^{20} + x^{4} + 1,
\end{aligned}$$

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

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

$$\begin{aligned}
p_0(x) &= x^{117} + x^{116} + x^{115} + x^{114} + x^{108} + x^{107} + x^{106} + x^{103} + x^{99} + x^{98} \\
&\quad + x^{97} + x^{94} + x^{93} + x^{91} + x^{89} + x^{88} + x^{87} + x^{85} + x^{84} + x^{83} + x^{81} \\
&\quad + x^{78} + x^{76} + x^{75} + x^{73} + x^{69} + x^{68} + x^{65} + x^{64} + x^{63} + x^{61} + x^{60} \\
&\quad + x^{58} + x^{57} + x^{56} + x^{54} + x^{53} + x^{52} + x^{51} + x^{50} + x^{47} + x^{46} + x^{44} \\
&\quad + x^{42} + x^{41} + x^{37} + x^{36} + x^{35} + x^{33}, \\
p_3(x) &= x^{101} + x^{100} + x^{99} + x^{98} + x^{97} + x^{96} + x^{87} + x^{85} + x^{84} + x^{83} + x^{79} \\
&\quad + x^{78} + x^{77} + x^{73} + x^{72} + x^{70} + x^{69} + x^{68} + x^{67} + x^{66} + x^{64} + x^{63} \\
&\quad + x^{62} + x^{61} + x^{60} + x^{58} + x^{55} + x^{53} + x^{48} + x^{43} + x^{42} + x^{41} + x^{35} \\
&\quad + x^{34} + x^{33} + x^{31} + x^{27} + x^{24} + x^{22} + x^{20} + x^{18} + x^{16} + x^{15} + x^{12}, \\
p_6(x) &= x^{97} + x^{96} + x^{95} + x^{94} + x^{93} + x^{92} + x^{89} + x^{88} + x^{84} + x^{82} + x^{80} \\
&\quad + x^{79} + x^{75} + x^{74} + x^{73} + x^{71} + x^{64} + x^{61} + x^{60} + x^{59} + x^{58} + x^{55} \\
&\quad + x^{53} + x^{52} + x^{42} + x^{39} + x^{36} + x^{35} + x^{33} + x^{31} + x^{30} + x^{29} + x^{28} \\
&\quad + x^{25} + x^{23} + x^{22} + x^{20} + x^{15} + x^{14} + x^{11} + x^{8} + x^{5} + x^{4} + 1, \\
p_9(x) &= x^{89} + x^{88} + x^{84} + x^{73} + x^{72} + x^{68} + x^{41} + x^{40} + x^{36} + x^{9} + x^{8} + x^{4}, \\
p_{12}(x) &= x^{85} + x^{84} + x^{80} + x^{73} + x^{72} + x^{69} + x^{64} + x^{37} + x^{36} + x^{32} + x^{25} \\
&\quad + x^{24} + x^{20} + x^{9} + x^{8} + x^{5} + 1,
\end{aligned}$$

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

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

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

n	$\Lambda(n)$	n	$\Lambda(n)$	n	$\Lambda(n)$	n	$\Lambda(n)$
0	[1, 2]	721	[1103, 1104]	1442	[1814, 1521]	2163	[2253, 2409]
1	[3, 4]	722	[1105, 1106]	1443	[1815, 911]	2164	[2410, 292]
2	[5, 6]	723	[1107, 982]	1444	[1816, 1582]	2165	[294, 2208]
3	[7, 8]	724	[1108, 331]	1445	[1817, 21]	2166	[252, 2288]
4	[9, 10]	725	[119, 817]	1446	[1818, 85]	2167	[1080, 1587]
5	[11, 12]	726	[1109, 1110]	1447	[1819, 289]	2168	[89, 2266]
6	[13, 14]	727	[370, 1111]	1448	[1820, 974]	2169	[2411, 2412]
7	[15, 16]	728	[816, 1112]	1449	[1665, 1699]	2170	[2413, 1266]
8	[17, 18]	729	[1113, 334]	1450	[1821, 1078]	2171	[1161, 51]
9	[19, 20]	730	[1114, 1115]	1451	[1001, 736]	2172	[1273, 1169]
10	[21, 22]	731	[1116, 851]	1452	[1822, 1621]	2173	[2414, 590]
11	[23, 24]	732	[1117, 923]	1453	[765, 1823]	2174	[2415, 532]
12	[25, 26]	733	[1118, 1119]	1454	[1824, 361]	2175	[2416, 675]
13	[27, 28]	734	[1120, 651]	1455	[1072, 273]	2176	[2417, 160]
14	[29, 30]	735	[1121, 469]	1456	[1825, 1826]	2177	[2418, 685]
15	[31, 32]	736	[1122, 471]	1457	[1827, 746]	2178	[2419, 715]
16	[33, 34]	737	[1123, 710]	1458	[1828, 843]	2179	[2420, 1230]
17	[35, 36]	738	[1124, 1125]	1459	[1829, 1627]	2180	[2421, 536]
18	[37, 38]	739	[681, 605]	1460	[1830, 924]	2181	[2422, 201]
19	[39, 40]	740	[1126, 210]	1461	[1636, 850]	2182	[2423, 447]
20	[41, 42]	741	[1127, 1128]	1462	[1831, 1555]	2183	[1923, 1477]
21	[43, 44]	742	[1129, 188]	1463	[900, 1832]	2184	[1281, 1413]
22	[45, 46]	743	[1130, 1131]	1464	[1833, 1806]	2185	[2424, 491]
23	[47, 48]	744	[1132, 1133]	1465	[1834, 1835]	2186	[2425, 1335]
24	[49, 50]	745	[480, 655]	1466	[1792, 1836]	2187	[2426, 480]
25	[51, 52]	746	[1134, 200]	1467	[1837, 1838]	2188	[2427, 1347]
26	[53, 54]	747	[708, 475]	1468	[1839, 65]	2189	[2428, 1416]
27	[55, 56]	748	[1135, 148]	1469	[1840, 1579]	2190	[2429, 1195]
28	[57, 58]	749	[1136, 1131]	1470	[758, 894]	2191	[2430, 468]
29	[59, 60]	750	[1137, 658]	1471	[326, 901]	2192	[2431, 1476]
30	[61, 62]	751	[1138, 590]	1472	[1841, 1022]	2193	[2432, 619]
31	[63, 64]	752	[1139, 1140]	1473	[1842, 18]	2194	[2433, 1300]
32	[65, 66]	753	[1141, 1142]	1474	[1843, 426]	2195	[2434, 167]
33	[67, 68]	754	[1140, 226]	1475	[1844, 1845]	2196	[2435, 685]
34	[69, 70]	755	[1143, 1144]	1476	[1846, 1562]	2197	[2436, 1189]
35	[71, 72]	756	[1145, 1146]	1477	[1847, 1559]	2198	[1461, 218]
36	[73, 74]	757	[590, 50]	1478	[1848, 1705]	2199	[2437, 1140]
37	[75, 76]	758	[1147, 607]	1479	[1849, 1850]	2200	[1471, 1258]
38	[77, 78]	759	[1148, 1149]	1480	[1851, 1595]	2201	[2438, 1326]

39	[79, 80]	760	[622, 1150]	1481	[1852, 1071]	2202	[2439, 1169]
40	[81, 82]	761	[48, 1151]	1482	[1853, 255]	2203	[562, 1342]
41	[83, 84]	762	[1152, 470]	1483	[1854, 976]	2204	[2440, 1914]
42	[85, 86]	763	[1153, 1154]	1484	[1855, 1856]	2205	[2441, 1370]
43	[87, 88]	764	[703, 1155]	1485	[1857, 290]	2206	[1924, 556]
44	[89, 90]	765	[1156, 1157]	1486	[1858, 741]	2207	[2442, 723]
45	[91, 92]	766	[173, 665]	1487	[1859, 1535]	2208	[1151, 127]
46	[93, 94]	767	[1158, 174]	1488	[1860, 828]	2209	[2443, 583]
47	[95, 96]	768	[1159, 630]	1489	[1861, 1862]	2210	[2444, 1212]
48	[80, 97]	769	[1160, 1161]	1490	[1863, 645]	2211	[1210, 1280]
49	[98, 99]	770	[1162, 221]	1491	[1864, 646]	2212	[2445, 556]
50	[100, 101]	771	[219, 59]	1492	[1865, 516]	2213	[2446, 2063]
51	[102, 103]	772	[1163, 197]	1493	[1866, 1867]	2214	[2447, 502]
52	[104, 105]	773	[1164, 678]	1494	[1868, 649]	2215	[2448, 151]
53	[106, 107]	774	[227, 491]	1495	[667, 1194]	2216	[2449, 1203]
54	[108, 109]	775	[516, 1165]	1496	[1250, 674]	2217	[2450, 667]
55	[110, 111]	776	[1166, 587]	1497	[1869, 1176]	2218	[2451, 1923]
56	[112, 113]	777	[1167, 144]	1498	[1870, 1255]	2219	[2452, 152]
57	[114, 115]	778	[1168, 211]	1499	[1871, 1422]	2220	[2453, 1149]
58	[116, 117]	779	[1169, 171]	1500	[714, 710]	2221	[2454, 531]
59	[118, 119]	780	[1170, 1171]	1501	[1872, 653]	2222	[2455, 44]
60	[120, 121]	781	[1172, 504]	1502	[1873, 145]	2223	[1351, 1439]
61	[122, 123]	782	[1173, 1174]	1503	[1874, 1875]	2224	[2456, 449]
62	[124, 125]	783	[1175, 1176]	1504	[1476, 1876]	2225	[2457, 458]
63	[126, 127]	784	[1177, 489]	1505	[1877, 1878]	2226	[2458, 711]
64	[128, 129]	785	[1178, 591]	1506	[1879, 654]	2227	[2459, 156]
65	[130, 131]	786	[1179, 539]	1507	[1880, 439]	2228	[2460, 492]
66	[54, 132]	787	[187, 1180]	1508	[1881, 1335]	2229	[2461, 618]
67	[133, 134]	788	[1181, 475]	1509	[532, 168]	2230	[1144, 146]
68	[135, 136]	789	[1182, 1132]	1510	[534, 1882]	2231	[2462, 512]
69	[137, 138]	790	[1183, 727]	1511	[1883, 1317]	2232	[2463, 1143]
70	[139, 140]	791	[1184, 684]	1512	[165, 533]	2233	[2464, 683]
71	[141, 142]	792	[1185, 520]	1513	[1884, 552]	2234	[2465, 1358]
72	[143, 140]	793	[458, 199]	1514	[1885, 648]	2235	[627, 1211]
73	[144, 145]	794	[551, 161]	1515	[1886, 607]	2236	[2466, 1924]
74	[146, 10]	795	[1186, 1187]	1516	[439, 578]	2237	[2467, 583]
75	[147, 148]	796	[1188, 1189]	1517	[535, 542]	2238	[2468, 591]
76	[149, 150]	797	[1190, 697]	1518	[1887, 214]	2239	[2469, 616]
77	[151, 152]	798	[1191, 56]	1519	[1888, 1377]	2240	[2470, 211]
78	[153, 154]	799	[649, 1182]	1520	[1889, 694]	2241	[154, 1302]
79	[155, 156]	800	[561, 45]	1521	[1227, 600]	2242	[2471, 464]
80	[157, 158]	801	[1192, 1193]	1522	[1407, 1276]	2243	[2472, 1932]
81	[159, 160]	802	[1194, 1195]	1523	[1416, 1395]	2244	[2473, 1320]
82	[161, 134]	803	[1196, 1197]	1524	[492, 1272]	2245	[2474, 184]

83	[162, 163]	804	[1198, 663]	1525	[1269, 131]	2246	[2475, 506]
84	[164, 165]	805	[1199, 1166]	1526	[152, 1867]	2247	[2476, 1190]
85	[166, 167]	806	[1200, 1201]	1527	[1890, 647]	2248	[1432, 581]
86	[168, 169]	807	[1202, 1203]	1528	[1133, 1398]	2249	[2477, 1242]
87	[170, 171]	808	[1204, 1205]	1529	[1891, 724]	2250	[2478, 633]
88	[172, 173]	809	[56, 1206]	1530	[1892, 571]	2251	[2479, 536]
89	[174, 151]	810	[1207, 628]	1531	[1296, 1893]	2252	[2480, 187]
90	[175, 176]	811	[1208, 1209]	1532	[1894, 509]	2253	[2481, 1180]
91	[177, 178]	812	[539, 1210]	1533	[1895, 656]	2254	[2482, 471]
92	[179, 180]	813	[1211, 1212]	1534	[1896, 435]	2255	[2483, 636]
93	[181, 182]	814	[451, 669]	1535	[1897, 1898]	2256	[2484, 1261]
94	[183, 184]	815	[1213, 1141]	1536	[1899, 1225]	2257	[2485, 1288]
95	[185, 60]	816	[576, 1214]	1537	[1900, 1882]	2258	[2486, 1211]
96	[186, 187]	817	[223, 179]	1538	[132, 487]	2259	[2487, 138]
97	[156, 188]	818	[148, 163]	1539	[1142, 1278]	2260	[1413, 724]
98	[189, 190]	819	[233, 1215]	1540	[1901, 645]	2261	[2488, 1166]
99	[191, 192]	820	[212, 1159]	1541	[1902, 1903]	2262	[2489, 129]
100	[58, 193]	821	[673, 544]	1542	[729, 625]	2263	[2490, 203]
101	[176, 194]	822	[1216, 538]	1543	[1904, 699]	2264	[2491, 640]
102	[195, 132]	823	[14, 477]	1544	[1905, 530]	2265	[2492, 1461]
103	[196, 197]	824	[1217, 1218]	1545	[1906, 222]	2266	[472, 1442]
104	[198, 199]	825	[158, 1219]	1546	[1907, 1476]	2267	[2493, 1284]
105	[200, 201]	826	[1220, 450]	1547	[1908, 663]	2268	[1969, 196]
106	[202, 203]	827	[1221, 153]	1548	[1909, 1194]	2269	[2494, 578]
107	[204, 187]	828	[1222, 631]	1549	[1910, 674]	2270	[2495, 564]
108	[205, 206]	829	[542, 704]	1550	[1911, 489]	2271	[2496, 570]
109	[207, 208]	830	[1223, 686]	1551	[1912, 1913]	2272	[2497, 604]
110	[209, 210]	831	[660, 1224]	1552	[1914, 1314]	2273	[1321, 677]
111	[211, 212]	832	[1225, 1226]	1553	[1915, 1377]	2274	[2498, 1874]
112	[197, 207]	833	[1180, 1227]	1554	[1916, 1429]	2275	[2499, 212]
113	[213, 214]	834	[1228, 199]	1555	[1917, 688]	2276	[2500, 651]
114	[215, 216]	835	[1229, 1230]	1556	[1918, 145]	2277	[2501, 473]
115	[217, 218]	836	[32, 611]	1557	[1919, 511]	2278	[683, 1299]
116	[206, 219]	837	[1231, 1197]	1558	[1330, 1920]	2279	[2502, 529]
117	[220, 221]	838	[1232, 144]	1559	[1176, 1921]	2280	[2503, 704]
118	[222, 223]	839	[688, 1233]	1560	[1921, 1922]	2281	[7, 587]
119	[224, 225]	840	[1234, 1150]	1561	[1439, 1923]	2282	[2504, 550]
120	[226, 227]	841	[604, 679]	1562	[1876, 1175]	2283	[2505, 60]
121	[228, 229]	842	[1235, 1236]	1563	[461, 1924]	2284	[2506, 1433]
122	[230, 231]	843	[1237, 550]	1564	[1294, 1173]	2285	[2507, 1395]
123	[232, 233]	844	[1238, 1239]	1565	[171, 698]	2286	[2508, 14]
124	[234, 235]	845	[1226, 508]	1566	[1925, 136]	2287	[2509, 582]
125	[236, 32]	846	[1240, 1241]	1567	[1926, 1878]	2288	[1233, 2027]
126	[237, 238]	847	[547, 157]	1568	[1927, 1195]	2289	[1474, 558]

127	[239, 240]	848	[1242, 642]	1569	[1928, 1204]	2290	[2510, 524]
128	[241, 242]	849	[1243, 448]	1570	[1929, 229]	2291	[2511, 518]
129	[243, 121]	850	[1244, 686]	1571	[1441, 509]	2292	[2512, 1219]
130	[244, 245]	851	[1245, 1246]	1572	[1203, 639]	2293	[2513, 223]
131	[246, 247]	852	[1247, 725]	1573	[1930, 674]	2294	[2514, 579]
132	[248, 249]	853	[1248, 440]	1574	[1931, 1272]	2295	[2515, 2028]
133	[250, 251]	854	[1249, 1250]	1575	[651, 1932]	2296	[2516, 618]
134	[252, 253]	855	[1251, 1252]	1576	[1933, 443]	2297	[2517, 1128]
135	[254, 255]	856	[727, 1140]	1577	[616, 1429]	2298	[2518, 581]
136	[256, 257]	857	[1253, 1238]	1578	[1934, 539]	2299	[2519, 165]
137	[258, 259]	858	[1254, 656]	1579	[1935, 1477]	2300	[1455, 1149]
138	[260, 261]	859	[1218, 159]	1580	[1936, 1937]	2301	[2520, 62]
139	[76, 262]	860	[526, 1255]	1581	[1938, 469]	2302	[2521, 698]
140	[263, 264]	861	[1256, 503]	1582	[1939, 1226]	2303	[1347, 1135]
141	[265, 266]	862	[1257, 1258]	1583	[1940, 1343]	2304	[2522, 438]
142	[267, 268]	863	[570, 531]	1584	[1941, 1186]	2305	[2523, 662]
143	[269, 270]	864	[1259, 1260]	1585	[1942, 683]	2306	[2524, 2034]
144	[271, 69]	865	[1261, 434]	1586	[1943, 505]	2307	[2525, 671]
145	[272, 273]	866	[1262, 451]	1587	[46, 618]	2308	[2526, 1455]
146	[274, 275]	867	[1263, 528]	1588	[1944, 1261]	2309	[2527, 36]
147	[276, 104]	868	[1264, 544]	1589	[611, 1914]	2310	[2528, 40]
148	[277, 278]	869	[538, 1265]	1590	[1945, 481]	2311	[2529, 59]
149	[279, 280]	870	[178, 1266]	1591	[430, 607]	2312	[2530, 1432]
150	[281, 282]	871	[1267, 625]	1592	[1946, 553]	2313	[485, 691]
151	[283, 284]	872	[1268, 1269]	1593	[1947, 526]	2314	[2531, 619]
152	[285, 286]	873	[1270, 168]	1594	[1948, 719]	2315	[2532, 12]
153	[287, 288]	874	[606, 1190]	1595	[1949, 483]	2316	[514, 494]
154	[289, 290]	875	[1271, 1215]	1596	[1362, 1485]	2317	[2533, 1893]
155	[291, 292]	876	[1272, 1197]	1597	[572, 1154]	2318	[208, 1898]
156	[293, 294]	877	[508, 1273]	1598	[1950, 175]	2319	[2534, 50]
157	[295, 296]	878	[1274, 178]	1599	[732, 1242]	2320	[2535, 46]
158	[63, 297]	879	[1275, 1276]	1600	[1951, 672]	2321	[2536, 1276]
159	[298, 299]	880	[1189, 1277]	1601	[1952, 455]	2322	[2537, 1356]
160	[300, 301]	881	[1278, 732]	1602	[644, 498]	2323	[2538, 615]
161	[302, 303]	882	[1279, 1135]	1603	[1343, 729]	2324	[2539, 608]
162	[304, 305]	883	[1280, 1281]	1604	[1953, 1159]	2325	[504, 175]
163	[306, 307]	884	[1282, 1193]	1605	[34, 1354]	2326	[2540, 730]
164	[308, 309]	885	[494, 12]	1606	[1954, 630]	2327	[2541, 451]
165	[310, 311]	886	[1283, 1122]	1607	[1955, 611]	2328	[2542, 1921]
166	[312, 313]	887	[449, 1284]	1608	[1956, 1442]	2329	[2543, 438]
167	[314, 315]	888	[456, 236]	1609	[1957, 169]	2330	[2544, 658]
168	[316, 317]	889	[1285, 454]	1610	[1958, 721]	2331	[2545, 437]
169	[318, 319]	890	[1286, 488]	1611	[1959, 482]	2332	[2546, 227]
170	[117, 320]	891	[1206, 1230]	1612	[1960, 1192]	2333	[2547, 233]

171	[321, 322]	892	[482, 1236]	1613	[1961, 472]	2334	[2548, 192]
172	[323, 324]	893	[1277, 576]	1614	[1962, 473]	2335	[2549, 54]
173	[325, 326]	894	[1287, 562]	1615	[1150, 529]	2336	[2550, 677]
174	[327, 328]	895	[695, 1288]	1616	[1963, 1882]	2337	[2551, 522]
175	[329, 70]	896	[1289, 1192]	1617	[1964, 1185]	2338	[2552, 236]
176	[330, 331]	897	[1290, 584]	1618	[1965, 458]	2339	[2553, 1233]
177	[332, 84]	898	[1291, 1138]	1619	[1212, 727]	2340	[2554, 1288]
178	[333, 334]	899	[619, 1292]	1620	[1966, 533]	2341	[1405, 621]
179	[335, 336]	900	[506, 1138]	1621	[1967, 1308]	2342	[2555, 1200]
180	[337, 338]	901	[578, 183]	1622	[1968, 568]	2343	[2556, 231]
181	[339, 340]	902	[1284, 1244]	1623	[710, 1969]	2344	[600, 1119]
182	[341, 77]	903	[437, 614]	1624	[1970, 465]	2345	[2557, 200]
183	[342, 343]	904	[1293, 1294]	1625	[1971, 667]	2346	[1125, 40]
184	[344, 345]	905	[1295, 1296]	1626	[1972, 127]	2347	[2558, 542]
185	[346, 347]	906	[1297, 630]	1627	[1973, 1167]	2348	[2559, 686]
186	[348, 349]	907	[1298, 1299]	1628	[564, 61]	2349	[2560, 1312]
187	[350, 351]	908	[1300, 1301]	1629	[1422, 1937]	2350	[2561, 1218]
188	[292, 352]	909	[1302, 457]	1630	[1974, 1240]	2351	[2562, 207]
189	[342, 353]	910	[671, 1303]	1631	[1975, 687]	2352	[2563, 640]
190	[354, 355]	911	[1304, 730]	1632	[1976, 213]	2353	[701, 1913]
191	[356, 357]	912	[225, 489]	1633	[1977, 711]	2354	[2564, 1903]
192	[358, 119]	913	[1146, 705]	1634	[1978, 1246]	2355	[2565, 1914]
193	[359, 360]	914	[1305, 594]	1635	[1979, 1244]	2356	[2566, 595]
194	[361, 103]	915	[1306, 193]	1636	[1980, 204]	2357	[2567, 1193]
195	[362, 363]	916	[1307, 1308]	1637	[1171, 682]	2358	[2568, 678]
196	[364, 29]	917	[917, 917]	1638	[1981, 724]	2359	[2569, 2033]
197	[365, 366]	918	[1309, 701]	1639	[1982, 1485]	2360	[2570, 161]
198	[367, 21]	919	[1310, 1190]	1640	[1983, 1429]	2361	[2571, 1913]
199	[368, 240]	920	[1311, 1200]	1641	[1984, 487]	2362	[2572, 1182]
200	[369, 370]	921	[1312, 14]	1642	[1985, 483]	2363	[2573, 712]
201	[371, 372]	922	[1313, 695]	1643	[52, 570]	2364	[2574, 567]
202	[373, 368]	923	[1314, 1192]	1644	[1986, 140]	2365	[2575, 163]
203	[374, 375]	924	[1315, 666]	1645	[1987, 547]	2366	[2576, 679]
204	[376, 377]	925	[629, 565]	1646	[1988, 447]	2367	[2577, 1143]
205	[378, 379]	926	[1316, 232]	1647	[1989, 175]	2368	[2578, 1272]
206	[247, 118]	927	[593, 1240]	1648	[1990, 565]	2369	[2579, 235]
207	[380, 381]	928	[1317, 1136]	1649	[1991, 697]	2370	[2580, 1356]
208	[382, 383]	929	[1318, 1319]	1650	[1992, 1239]	2371	[2581, 682]
209	[384, 385]	930	[1266, 1320]	1651	[1433, 538]	2372	[2582, 51]
210	[386, 387]	931	[510, 1321]	1652	[1993, 1174]	2373	[2028, 203]
211	[388, 74]	932	[1322, 513]	1653	[1994, 220]	2374	[2583, 448]
212	[389, 390]	933	[1323, 1324]	1654	[1995, 233]	2375	[2584, 1353]
213	[391, 392]	934	[1325, 1165]	1655	[1882, 1143]	2376	[2585, 1280]
214	[393, 394]	935	[687, 142]	1656	[1276, 703]	2377	[549, 58]

215	[395, 396]	936	[199, 1326]	1657	[1996, 474]	2378	[2586, 463]
216	[264, 397]	937	[145, 34]	1658	[719, 549]	2379	[2587, 2030]
217	[398, 399]	938	[1327, 1278]	1659	[1326, 1261]	2380	[2588, 1165]
218	[400, 401]	939	[1328, 1255]	1660	[1997, 1422]	2381	[2589, 1439]
219	[402, 403]	940	[1329, 1142]	1661	[1998, 1893]	2382	[2590, 1238]
220	[99, 404]	941	[556, 1307]	1662	[1999, 1258]	2383	[2591, 1301]
221	[101, 405]	942	[721, 1330]	1663	[2000, 1280]	2384	[2592, 1303]
222	[406, 335]	943	[1331, 173]	1664	[1209, 1402]	2385	[2593, 608]
223	[407, 408]	944	[1332, 1224]	1665	[2001, 1354]	2386	[2594, 158]
224	[409, 410]	945	[1333, 494]	1666	[2002, 478]	2387	[2595, 52]
225	[411, 412]	946	[1334, 605]	1667	[1265, 1146]	2388	[2596, 620]
226	[413, 401]	947	[1335, 481]	1668	[2003, 174]	2389	[2597, 596]
227	[414, 415]	948	[1336, 61]	1669	[2004, 631]	2390	[2598, 487]
228	[416, 417]	949	[1337, 150]	1670	[180, 564]	2391	[2599, 681]
229	[418, 287]	950	[1338, 232]	1671	[2005, 161]	2392	[2600, 183]
230	[419, 420]	951	[1339, 533]	1672	[2006, 545]	2393	[2601, 1260]
231	[421, 366]	952	[498, 653]	1673	[1903, 1874]	2394	[2602, 639]
232	[422, 423]	953	[1340, 159]	1674	[2007, 593]	2395	[1370, 524]
233	[424, 417]	954	[1341, 1302]	1675	[2008, 1449]	2396	[2603, 131]
234	[425, 363]	955	[640, 1200]	1676	[2009, 1132]	2397	[216, 178]
235	[426, 355]	956	[1342, 648]	1677	[2010, 592]	2398	[2604, 671]
236	[427, 428]	957	[1155, 1343]	1678	[2011, 1206]	2399	[2605, 1241]
237	[429, 430]	958	[1344, 717]	1679	[2012, 436]	2400	[2606, 482]
238	[431, 432]	959	[1345, 1119]	1680	[717, 1167]	2401	[2607, 201]
239	[433, 434]	960	[631, 1346]	1681	[2013, 475]	2402	[2608, 549]
240	[138, 435]	961	[545, 1347]	1682	[2014, 1174]	2403	[2609, 1434]
241	[436, 437]	962	[1348, 687]	1683	[2015, 476]	2404	[2610, 432]
242	[438, 439]	963	[1349, 1186]	1684	[2016, 694]	2405	[2611, 445]
243	[440, 441]	964	[1350, 1351]	1685	[2017, 1370]	2406	[2612, 545]
244	[442, 443]	965	[1352, 1353]	1686	[2018, 1400]	2407	[2613, 520]
245	[444, 445]	966	[1354, 488]	1687	[574, 1351]	2408	[2614, 1317]
246	[446, 222]	967	[1355, 472]	1688	[1308, 1324]	2409	[2615, 1471]
247	[447, 224]	968	[669, 1356]	1689	[201, 714]	2410	[2616, 1199]
248	[448, 449]	969	[1357, 1240]	1690	[2019, 218]	2411	[2617, 1133]
249	[450, 451]	970	[1246, 1358]	1691	[2020, 1402]	2412	[2618, 457]
250	[452, 46]	971	[1241, 552]	1692	[2021, 1358]	2413	[2619, 1645]
251	[453, 454]	972	[1359, 184]	1693	[2022, 1307]	2414	[1076, 100]
252	[455, 456]	973	[1360, 455]	1694	[42, 684]	2415	[1674, 2620]
253	[457, 458]	974	[1361, 1362]	1695	[2023, 560]	2416	[2621, 2388]
254	[459, 38]	975	[712, 483]	1696	[2024, 434]	2417	[1012, 2622]
255	[460, 461]	976	[1363, 1347]	1697	[2025, 566]	2418	[2347, 1551]
256	[462, 463]	977	[1364, 1365]	1698	[2026, 2027]	2419	[348, 409]
257	[464, 465]	978	[1366, 1169]	1699	[1375, 2028]	2420	[2359, 2623]
258	[466, 59]	979	[1367, 517]	1700	[2029, 600]	2421	[733, 1580]

259	[467, 468]	980	[1368, 440]	1701	[725, 2030]	2422	[2367, 2624]
260	[469, 470]	981	[1369, 228]	1702	[2031, 1284]	2423	[2404, 954]
261	[471, 472]	982	[566, 438]	1703	[2032, 1265]	2424	[1645, 846]
262	[473, 474]	983	[614, 1370]	1704	[2033, 461]	2425	[866, 813]
263	[475, 476]	984	[1371, 179]	1705	[2034, 1294]	2426	[426, 2397]
264	[477, 478]	985	[1119, 693]	1706	[2035, 1474]	2427	[301, 2289]
265	[479, 480]	986	[1372, 471]	1707	[2036, 1214]	2428	[2625, 1776]
266	[481, 482]	987	[1373, 1277]	1708	[2037, 142]	2429	[76, 831]
267	[136, 447]	988	[1374, 1375]	1709	[2038, 1314]	2430	[1019, 1807]
268	[483, 469]	989	[127, 1204]	1710	[2039, 514]	2431	[914, 2626]
269	[484, 485]	990	[1376, 714]	1711	[2040, 1320]	2432	[2627, 2628]
270	[486, 51]	991	[1358, 1377]	1712	[2041, 1471]	2433	[318, 778]
271	[487, 139]	992	[150, 1353]	1713	[2042, 1864]	2434	[1665, 846]
272	[488, 430]	993	[1378, 467]	1714	[1922, 2034]	2435	[2629, 1574]
273	[489, 182]	994	[1320, 1365]	1715	[2043, 646]	2436	[1806, 1655]
274	[490, 491]	995	[1379, 1211]	1716	[2044, 1441]	2437	[1637, 320]
275	[445, 492]	996	[512, 571]	1717	[2045, 2046]	2438	[1630, 1592]
276	[493, 494]	997	[160, 1317]	1718	[2047, 2027]	2439	[1072, 2630]
277	[495, 496]	998	[1380, 1312]	1719	[2048, 1242]	2440	[2627, 2631]
278	[474, 448]	999	[1381, 464]	1720	[2049, 236]	2441	[2632, 2296]
279	[497, 498]	1000	[1382, 1122]	1721	[2050, 1168]	2442	[967, 1728]
280	[499, 500]	1001	[1383, 1342]	1722	[2051, 456]	2443	[2633, 2634]
281	[501, 502]	1002	[1384, 1346]	1723	[2052, 1416]	2444	[2635, 2636]
282	[491, 503]	1003	[620, 1296]	1724	[2053, 1413]	2445	[2209, 2637]
283	[192, 504]	1004	[1385, 572]	1725	[2054, 530]	2446	[2366, 2638]
284	[505, 506]	1005	[1386, 704]	1726	[203, 455]	2447	[371, 1629]
285	[507, 508]	1006	[1387, 729]	1727	[2055, 535]	2448	[2639, 285]
286	[509, 510]	1007	[1388, 216]	1728	[167, 1253]	2449	[956, 1667]
287	[511, 512]	1008	[1389, 1161]	1729	[1219, 1864]	2450	[2640, 79]
288	[513, 514]	1009	[1390, 160]	1730	[2056, 477]	2451	[2641, 2642]
289	[515, 516]	1010	[1131, 1161]	1731	[2057, 1136]	2452	[2643, 2365]
290	[517, 518]	1011	[1201, 1122]	1732	[1920, 1128]	2453	[1577, 999]
291	[519, 520]	1012	[1391, 1175]	1733	[2058, 1381]	2454	[2639, 886]
292	[521, 522]	1013	[1392, 477]	1734	[2059, 565]	2455	[2217, 1589]
293	[523, 524]	1014	[1393, 435]	1735	[2060, 1867]	2456	[2644, 285]
294	[525, 526]	1015	[1394, 1395]	1736	[2061, 1144]	2457	[80, 2645]
295	[527, 528]	1016	[1396, 572]	1737	[2062, 596]	2458	[379, 818]
296	[529, 530]	1017	[1397, 1398]	1738	[1400, 2063]	2459	[2198, 2300]
297	[40, 48]	1018	[1399, 510]	1739	[2064, 1354]	2460	[260, 1850]
298	[531, 532]	1019	[1365, 1400]	1740	[2065, 227]	2461	[2222, 984]
299	[533, 534]	1020	[1401, 1402]	1741	[2066, 684]	2462	[2646, 2294]
300	[8, 535]	1021	[1403, 54]	1742	[2067, 1898]	2463	[986, 1713]
301	[10, 536]	1022	[1404, 214]	1743	[2068, 598]	2464	[748, 2373]
302	[537, 538]	1023	[1195, 1405]	1744	[2069, 1157]	2465	[2647, 981]

303	[528, 539]	1024	[1406, 1407]	1745	[2070, 688]	2466	[2648, 2649]
304	[540, 188]	1025	[1408, 582]	1746	[2071, 1141]	2467	[2321, 2650]
305	[541, 542]	1026	[715, 583]	1747	[2072, 511]	2468	[2185, 967]
306	[543, 505]	1027	[1409, 128]	1748	[2073, 621]	2469	[2651, 769]
307	[544, 545]	1028	[1410, 190]	1749	[2074, 180]	2470	[2330, 969]
308	[546, 547]	1029	[1411, 560]	1750	[2075, 715]	2471	[1065, 789]
309	[548, 549]	1030	[1412, 1413]	1751	[2076, 708]	2472	[1018, 1026]
310	[550, 551]	1031	[1414, 1249]	1752	[2077, 1278]	2473	[2652, 1743]
311	[552, 553]	1032	[1252, 1156]	1753	[522, 636]	2474	[953, 887]
312	[554, 159]	1033	[1415, 695]	1754	[435, 2046]	2475	[2653, 948]
313	[555, 556]	1034	[1197, 513]	1755	[2078, 176]	2476	[1668, 1080]
314	[557, 558]	1035	[691, 1416]	1756	[2079, 1321]	2477	[2190, 1022]
315	[463, 559]	1036	[615, 216]	1757	[2080, 562]	2478	[1536, 860]
316	[560, 561]	1037	[1417, 1269]	1758	[2081, 1969]	2479	[2654, 1570]
317	[12, 562]	1038	[231, 1199]	1759	[2082, 510]	2480	[2352, 1568]
318	[563, 564]	1039	[1418, 614]	1760	[2083, 1144]	2481	[2655, 2656]
319	[565, 566]	1040	[1419, 1420]	1761	[2084, 1205]	2482	[2657, 2658]
320	[567, 568]	1041	[1421, 207]	1762	[2085, 1442]	2483	[1769, 2659]
321	[569, 570]	1042	[1319, 1300]	1763	[2086, 1864]	2484	[2396, 1025]
322	[571, 572]	1043	[1236, 1422]	1764	[2087, 705]	2485	[27, 1555]
323	[573, 574]	1044	[1423, 1151]	1765	[2088, 219]	2486	[1567, 1615]
324	[575, 576]	1045	[1424, 1326]	1766	[2089, 441]	2487	[2660, 743]
325	[577, 578]	1046	[502, 663]	1767	[2090, 1292]	2488	[943, 2661]
326	[218, 579]	1047	[50, 220]	1768	[636, 1375]	2489	[23, 2658]
327	[580, 581]	1048	[1425, 179]	1769	[2091, 1875]	2490	[403, 2645]
328	[582, 190]	1049	[1426, 622]	1770	[2092, 1166]	2491	[2662, 88]
329	[583, 584]	1050	[1427, 1428]	1771	[2093, 220]	2492	[370, 2316]
330	[585, 586]	1051	[1429, 1185]	1772	[2094, 706]	2493	[2633, 2663]
331	[587, 535]	1052	[1430, 1252]	1773	[2095, 1451]	2494	[1064, 2184]
332	[588, 52]	1053	[142, 1407]	1774	[2096, 531]	2495	[272, 2630]
333	[589, 590]	1054	[1431, 1432]	1775	[2097, 2046]	2496	[1029, 885]
334	[591, 592]	1055	[500, 1433]	1776	[2098, 2030]	2497	[739, 2313]
335	[210, 593]	1056	[194, 1434]	1777	[675, 213]	2498	[2664, 2665]
336	[594, 595]	1057	[1435, 450]	1778	[2099, 197]	2499	[2293, 2666]
337	[596, 597]	1058	[1436, 698]	1779	[2100, 213]	2500	[938, 1729]
338	[169, 598]	1059	[468, 173]	1780	[214, 473]	2501	[2625, 804]
339	[599, 600]	1060	[1149, 547]	1781	[2101, 1969]	2502	[2298, 884]
340	[601, 571]	1061	[1437, 1249]	1782	[2102, 513]	2503	[786, 1003]
341	[602, 153]	1062	[1438, 1439]	1783	[2103, 1319]	2504	[973, 909]
342	[603, 604]	1063	[1440, 1441]	1784	[2104, 682]	2505	[2667, 1557]
343	[605, 606]	1064	[1442, 440]	1785	[2105, 1224]	2506	[1652, 2668]
344	[607, 608]	1065	[1443, 552]	1786	[2106, 169]	2507	[2392, 1063]
345	[524, 42]	1066	[1444, 1301]	1787	[2107, 1146]	2508	[2669, 868]
346	[609, 457]	1067	[1445, 146]	1788	[2108, 1150]	2509	[1843, 354]

347	[610, 611]	1068	[1446, 1151]	1789	[2109, 553]	2510	[2268, 1798]
348	[612, 496]	1069	[1447, 1407]	1790	[2110, 629]	2511	[2670, 742]
349	[613, 614]	1070	[1288, 1171]	1791	[2111, 1239]	2512	[427, 1655]
350	[140, 615]	1071	[1448, 1381]	1792	[2063, 591]	2513	[2671, 2623]
351	[553, 616]	1072	[62, 1449]	1793	[2112, 488]	2514	[2276, 1691]
352	[520, 617]	1073	[1450, 1451]	1794	[2113, 1932]	2515	[2672, 2673]
353	[618, 619]	1074	[1452, 1182]	1795	[662, 485]	2516	[2350, 995]
354	[530, 620]	1075	[1453, 622]	1796	[2114, 732]	2517	[1730, 2674]
355	[621, 622]	1076	[1454, 176]	1797	[2115, 666]	2518	[1618, 1038]
356	[623, 34]	1077	[656, 1455]	1798	[697, 582]	2519	[341, 887]
357	[624, 625]	1078	[1456, 1300]	1799	[2116, 1449]	2520	[2675, 735]
358	[626, 627]	1079	[1457, 1253]	1800	[2117, 691]	2521	[2376, 1082]
359	[628, 629]	1080	[1458, 725]	1801	[2118, 627]	2522	[2676, 2677]
360	[630, 631]	1081	[1459, 559]	1802	[2119, 132]	2523	[2678, 2679]
361	[632, 633]	1082	[1460, 1461]	1803	[2120, 1277]	2524	[2680, 940]
362	[634, 146]	1083	[1462, 551]	1804	[2121, 485]	2525	[2646, 2666]
363	[635, 636]	1084	[1463, 1131]	1805	[2122, 492]	2526	[2657, 24]
364	[637, 171]	1085	[1464, 628]	1806	[2123, 705]	2527	[2250, 2310]
365	[638, 183]	1086	[586, 511]	1807	[2027, 505]	2528	[2681, 1788]
366	[639, 640]	1087	[1258, 1461]	1808	[2124, 576]	2529	[981, 120]
367	[641, 642]	1088	[1465, 1365]	1809	[2125, 615]	2530	[1035, 1777]
368	[643, 644]	1089	[625, 1451]	1810	[2126, 574]	2531	[2682, 2683]
369	[645, 567]	1090	[1466, 1135]	1811	[1478, 2126]	2532	[2684, 2685]
370	[646, 647]	1091	[1467, 1433]	1812	[2127, 228]	2533	[977, 826]
371	[648, 649]	1092	[1468, 597]	1813	[2128, 626]	2534	[2686, 858]
372	[650, 651]	1093	[1469, 1219]	1814	[2129, 1185]	2535	[2687, 1541]
373	[652, 584]	1094	[38, 1125]	1815	[2130, 225]	2536	[1837, 2688]
374	[653, 654]	1095	[1470, 1214]	1816	[2131, 1342]	2537	[2287, 327]
375	[655, 656]	1096	[1255, 232]	1817	[2132, 45]	2538	[2632, 2689]
376	[657, 639]	1097	[665, 1471]	1818	[2133, 1398]	2539	[1827, 945]
377	[581, 658]	1098	[1472, 561]	1819	[2134, 648]	2540	[1067, 73]
378	[659, 660]	1099	[1473, 1474]	1820	[2135, 1400]	2541	[996, 1496]
379	[661, 53]	1100	[608, 137]	1821	[2136, 1299]	2542	[2690, 2691]
380	[568, 662]	1101	[454, 560]	1822	[2137, 500]	2543	[2692, 1675]
381	[663, 517]	1102	[1475, 1273]	1823	[1187, 1141]	2544	[418, 1047]
382	[664, 665]	1103	[1324, 1476]	1824	[2138, 196]	2545	[2693, 2688]
383	[666, 667]	1104	[1477, 1478]	1825	[2139, 53]	2546	[2629, 1691]
384	[668, 669]	1105	[1479, 1209]	1826	[2140, 1314]	2547	[284, 2395]
385	[670, 650]	1106	[1480, 1159]	1827	[2141, 693]	2548	[1099, 900]
386	[36, 671]	1107	[1481, 468]	1828	[2142, 654]	2549	[826, 248]
387	[672, 673]	1108	[1482, 32]	1829	[2143, 42]	2550	[929, 1089]
388	[674, 675]	1109	[1483, 1227]	1830	[2144, 1434]	2551	[417, 2260]
389	[676, 677]	1110	[1484, 1168]	1831	[2145, 1346]	2552	[2361, 959]
390	[678, 645]	1111	[1485, 200]	1832	[1878, 723]	2553	[1712, 987]

391	[617, 445]	1112	[1230, 192]	1833	[2146, 128]	2554	[2669, 302]
392	[679, 128]	1113	[1486, 1251]	1834	[2147, 1206]	2555	[792, 1726]
393	[680, 681]	1114	[1487, 464]	1835	[2148, 1875]	2556	[1049, 869]
394	[682, 683]	1115	[229, 1218]	1836	[1377, 711]	2557	[385, 371]
395	[684, 685]	1116	[1488, 579]	1837	[2149, 917]	2558	[862, 1086]
396	[686, 687]	1117	[1489, 525]	1838	[2150, 532]	2559	[1694, 1795]
397	[476, 688]	1118	[759, 895]	1839	[2151, 1215]	2560	[1776, 380]
398	[689, 58]	1119	[1490, 1491]	1840	[2152, 1362]	2561	[951, 298]
399	[690, 691]	1120	[1492, 1493]	1841	[2153, 1302]	2562	[2243, 1549]
400	[692, 693]	1121	[1494, 798]	1842	[2154, 620]	2563	[1031, 1589]
401	[694, 695]	1122	[1495, 242]	1843	[2155, 621]	2564	[2304, 2691]
402	[696, 697]	1123	[82, 1496]	1844	[2156, 706]	2565	[2682, 2332]
403	[698, 699]	1124	[1497, 1498]	1845	[2157, 211]	2566	[2694, 424]
404	[190, 672]	1125	[1499, 243]	1846	[1174, 721]	2567	[416, 855]
405	[193, 454]	1126	[789, 1500]	1847	[1875, 1903]	2568	[246, 1026]
406	[503, 594]	1127	[1501, 1502]	1848	[1128, 2033]	2569	[2695, 2674]
407	[700, 701]	1128	[1503, 1504]	1849	[2030, 596]	2570	[2696, 2697]
408	[470, 694]	1129	[1505, 1506]	1850	[129, 502]	2571	[976, 344]
409	[702, 703]	1130	[1507, 1508]	1851	[2158, 586]	2572	[104, 909]
410	[704, 626]	1131	[1509, 1510]	1852	[2159, 194]	2573	[346, 2182]
411	[705, 660]	1132	[1023, 316]	1853	[2160, 672]	2574	[2698, 2699]
412	[706, 450]	1133	[1511, 1512]	1854	[2161, 525]	2575	[2394, 421]
413	[707, 708]	1134	[1513, 1514]	1855	[2162, 206]	2576	[2700, 2701]
414	[709, 710]	1135	[1515, 1516]	1856	[2163, 574]	2577	[2702, 2703]
415	[711, 712]	1136	[301, 1517]	1857	[2164, 592]	2578	[1647, 1587]
416	[713, 714]	1137	[1518, 1519]	1858	[2165, 626]	2579	[292, 823]
417	[434, 715]	1138	[399, 839]	1859	[2166, 650]	2580	[2704, 884]
418	[716, 717]	1139	[1520, 413]	1860	[2167, 558]	2581	[2282, 1065]
419	[718, 719]	1140	[1110, 1521]	1861	[2168, 436]	2582	[2345, 104]
420	[720, 721]	1141	[1522, 902]	1862	[2169, 1922]	2583	[364, 983]
421	[722, 723]	1142	[1523, 1524]	1863	[2170, 929]	2584	[1007, 921]
422	[724, 628]	1143	[888, 1525]	1864	[297, 989]	2585	[1004, 1659]
423	[60, 725]	1144	[1526, 777]	1865	[2171, 2172]	2586	[1779, 921]
424	[726, 727]	1145	[1527, 1117]	1866	[2173, 756]	2587	[374, 2235]
425	[728, 729]	1146	[1528, 1510]	1867	[2171, 412]	2588	[16, 267]
426	[730, 36]	1147	[1529, 877]	1868	[1716, 1570]	2589	[2398, 2705]
427	[731, 732]	1148	[1530, 68]	1869	[2174, 2175]	2590	[2706, 2707]
428	[677, 706]	1149	[1531, 802]	1870	[2176, 2177]	2591	[1813, 111]
429	[733, 734]	1150	[1532, 1051]	1871	[2178, 1031]	2592	[2708, 1583]
430	[735, 736]	1151	[82, 997]	1872	[2179, 2180]	2593	[2709, 258]
431	[737, 738]	1152	[1533, 1076]	1873	[2181, 2182]	2594	[2368, 1021]
432	[739, 249]	1153	[1534, 1535]	1874	[1564, 1104]	2595	[2670, 256]
433	[740, 741]	1154	[1536, 1491]	1875	[2183, 1564]	2596	[2280, 349]
434	[742, 257]	1155	[395, 1525]	1876	[1705, 1563]	2597	[822, 769]

435	[743, 107]	1156	[1537, 1538]	1877	[847, 2184]	2598	[319, 779]
436	[744, 745]	1157	[754, 1539]	1878	[1779, 112]	2599	[948, 983]
437	[79, 403]	1158	[1540, 1541]	1879	[2185, 281]	2600	[293, 344]
438	[746, 747]	1159	[1542, 253]	1880	[2186, 894]	2601	[1107, 857]
439	[748, 749]	1160	[1543, 1040]	1881	[2187, 1693]	2602	[743, 1019]
440	[750, 751]	1161	[1508, 1516]	1882	[78, 902]	2603	[251, 354]
441	[752, 753]	1162	[1544, 1080]	1883	[2188, 2189]	2604	[2710, 2711]
442	[754, 755]	1163	[1545, 1546]	1884	[120, 1754]	2605	[2712, 6]
443	[756, 757]	1164	[1547, 1548]	1885	[2190, 1029]	2606	[2706, 2180]
444	[758, 759]	1165	[110, 406]	1886	[2191, 1862]	2607	[2406, 2636]
445	[760, 761]	1166	[1549, 1512]	1887	[336, 1836]	2608	[2212, 2307]
446	[762, 407]	1167	[1550, 272]	1888	[2192, 2193]	2609	[2242, 256]
447	[428, 411]	1168	[1551, 829]	1889	[2194, 1078]	2610	[1678, 353]
448	[763, 328]	1169	[1552, 1111]	1890	[2195, 1007]	2611	[2326, 251]
449	[764, 381]	1170	[1553, 1554]	1891	[2196, 124]	2612	[2621, 2309]
450	[765, 766]	1171	[1555, 809]	1892	[2197, 938]	2613	[1831, 28]
451	[767, 768]	1172	[1556, 1557]	1893	[2198, 317]	2614	[807, 1659]
452	[769, 283]	1173	[1558, 1559]	1894	[2199, 1639]	2615	[2713, 2714]
453	[770, 393]	1174	[1560, 1561]	1895	[1550, 1072]	2616	[2715, 382]
454	[117, 771]	1175	[1562, 942]	1896	[760, 2200]	2617	[2692, 2620]
455	[772, 86]	1176	[1563, 1564]	1897	[1696, 416]	2618	[2702, 2716]
456	[773, 774]	1177	[1565, 755]	1898	[1849, 261]	2619	[2717, 1375]
457	[290, 775]	1178	[1566, 862]	1899	[2201, 1567]	2620	[2718, 430]
458	[776, 777]	1179	[4, 1567]	1900	[2202, 1058]	2621	[2719, 193]
459	[778, 779]	1180	[1568, 955]	1901	[267, 2203]	2622	[2720, 617]
460	[780, 781]	1181	[1569, 807]	1902	[2204, 2205]	2623	[2721, 1171]
461	[782, 783]	1182	[1570, 1571]	1903	[2206, 1848]	2624	[2722, 566]
462	[784, 785]	1183	[800, 1572]	1904	[2207, 93]	2625	[2723, 703]
463	[786, 787]	1184	[1573, 1067]	1905	[1006, 73]	2626	[2724, 1455]
464	[788, 352]	1185	[1574, 1575]	1906	[344, 2208]	2627	[2725, 1210]
465	[789, 311]	1186	[1070, 795]	1907	[2209, 2210]	2628	[2726, 158]
466	[790, 791]	1187	[1576, 1577]	1908	[776, 2211]	2629	[2727, 1937]
467	[792, 793]	1188	[1578, 1579]	1909	[2212, 2213]	2630	[443, 1441]
468	[794, 795]	1189	[1580, 985]	1910	[2214, 1614]	2631	[2728, 699]
469	[796, 797]	1190	[1565, 1539]	1911	[2215, 341]	2632	[2729, 1241]
470	[798, 799]	1191	[1581, 1582]	1912	[2216, 1017]	2633	[2730, 1201]
471	[800, 801]	1192	[1583, 757]	1913	[2217, 1032]	2634	[2731, 518]
472	[242, 802]	1193	[1584, 1070]	1914	[988, 1053]	2635	[2732, 504]
473	[803, 125]	1194	[1585, 25]	1915	[2218, 2219]	2636	[2733, 1199]
474	[804, 764]	1195	[288, 117]	1916	[1860, 1551]	2637	[2734, 1233]
475	[805, 806]	1196	[1586, 1009]	1917	[2220, 1758]	2638	[2735, 597]
476	[807, 808]	1197	[1587, 90]	1918	[1556, 2221]	2639	[2736, 509]
477	[28, 809]	1198	[1588, 864]	1919	[2222, 99]	2640	[2737, 226]
478	[30, 423]	1199	[307, 284]	1920	[1104, 1504]	2641	[2738, 152]

479	[810, 811]	1200	[1589, 854]	1921	[942, 783]	2642	[2739, 180]
480	[787, 812]	1201	[1099, 326]	1922	[2223, 1673]	2643	[2740, 1485]
481	[813, 814]	1202	[1590, 1584]	1923	[1714, 1848]	2644	[2741, 1428]
482	[815, 383]	1203	[978, 739]	1924	[1811, 1562]	2645	[592, 463]
483	[816, 817]	1204	[238, 1591]	1925	[20, 64]	2646	[2742, 627]
484	[818, 819]	1205	[1592, 415]	1926	[2224, 342]	2647	[2743, 157]
485	[820, 821]	1206	[111, 335]	1927	[2225, 1719]	2648	[2744, 606]
486	[822, 306]	1207	[1573, 1006]	1928	[2226, 1592]	2649	[2745, 1405]
487	[823, 263]	1208	[1593, 1594]	1929	[2227, 1650]	2650	[2746, 649]
488	[824, 825]	1209	[1595, 836]	1930	[906, 1056]	2651	[2747, 544]
489	[826, 739]	1210	[1567, 301]	1931	[2228, 919]	2652	[2748, 229]
490	[827, 313]	1211	[1596, 370]	1932	[1729, 881]	2653	[2749, 568]
491	[828, 829]	1212	[808, 1597]	1933	[2229, 341]	2654	[2750, 182]
492	[251, 426]	1213	[1598, 853]	1934	[1602, 2230]	2655	[2751, 534]
493	[830, 831]	1214	[1599, 961]	1935	[2231, 2232]	2656	[2752, 1205]
494	[832, 833]	1215	[1600, 386]	1936	[2233, 1826]	2657	[2753, 129]
495	[834, 835]	1216	[1576, 337]	1937	[2234, 744]	2658	[2754, 498]
496	[836, 268]	1217	[1601, 835]	1938	[892, 2235]	2659	[2755, 208]
497	[837, 838]	1218	[1602, 1603]	1939	[2236, 2237]	2660	[2756, 204]
498	[839, 814]	1219	[1021, 876]	1940	[2238, 1113]	2661	[2757, 474]
499	[840, 807]	1220	[1604, 767]	1941	[2239, 1576]	2662	[2758, 61]
500	[343, 841]	1221	[895, 1605]	1942	[2240, 1679]	2663	[2759, 196]
501	[842, 843]	1222	[1606, 1106]	1943	[242, 2241]	2664	[2760, 208]
502	[844, 845]	1223	[1607, 246]	1944	[2242, 742]	2665	[2761, 48]
503	[846, 847]	1224	[1608, 1077]	1945	[2243, 1511]	2666	[2762, 1138]
504	[848, 801]	1225	[1032, 854]	1946	[2244, 993]	2667	[2763, 675]
505	[849, 850]	1226	[1609, 1577]	1947	[2245, 1027]	2668	[2764, 512]
506	[851, 751]	1227	[351, 1036]	1948	[2246, 1054]	2669	[2765, 465]
507	[852, 853]	1228	[844, 1011]	1949	[2247, 796]	2670	[2766, 598]
508	[854, 765]	1229	[1610, 1611]	1950	[1659, 2248]	2671	[2767, 461]
509	[855, 856]	1230	[1612, 848]	1951	[2249, 1054]	2672	[2768, 712]
510	[857, 241]	1231	[1490, 860]	1952	[119, 1112]	2673	[2769, 526]
511	[105, 252]	1232	[1613, 1614]	1953	[1778, 1007]	2674	[2, 1281]
512	[858, 859]	1233	[1615, 1517]	1954	[814, 1689]	2675	[2770, 508]
513	[860, 369]	1234	[1616, 20]	1955	[2250, 1537]	2676	[2771, 673]
514	[379, 25]	1235	[1617, 1618]	1956	[2251, 295]	2677	[2772, 629]
515	[861, 110]	1236	[814, 1619]	1957	[2252, 974]	2678	[2773, 1136]
516	[862, 863]	1237	[1620, 1621]	1958	[2253, 2254]	2679	[2774, 1253]
517	[864, 865]	1238	[1622, 259]	1959	[2255, 2256]	2680	[2775, 646]
518	[866, 839]	1239	[1623, 1619]	1960	[2257, 1584]	2681	[2776, 1343]
519	[867, 868]	1240	[387, 910]	1961	[808, 2248]	2682	[2777, 1194]
520	[869, 870]	1241	[968, 372]	1962	[2258, 1608]	2683	[2778, 441]
521	[871, 872]	1242	[1624, 296]	1963	[1654, 1089]	2684	[2779, 1265]
522	[352, 263]	1243	[1625, 1062]	1964	[91, 869]	2685	[2780, 1252]

523	[873, 85]	1244	[381, 957]	1965	[2259, 368]	2686	[2781, 1420]
524	[874, 397]	1245	[1626, 1627]	1966	[855, 2260]	2687	[2782, 1225]
525	[875, 876]	1246	[319, 1628]	1967	[2261, 2262]	2688	[2783, 653]
526	[877, 754]	1247	[968, 1629]	1968	[2263, 1085]	2689	[2784, 151]
527	[878, 879]	1248	[1630, 414]	1969	[2264, 1591]	2690	[2785, 1238]
528	[880, 881]	1249	[952, 299]	1970	[2265, 1091]	2691	[2786, 1155]
529	[882, 883]	1250	[1071, 272]	1971	[1587, 2266]	2692	[2787, 1321]
530	[884, 377]	1251	[1631, 66]	1972	[1096, 1823]	2693	[2788, 1308]
531	[885, 316]	1252	[753, 754]	1973	[2218, 2267]	2694	[2789, 644]
532	[886, 286]	1253	[415, 351]	1974	[1857, 2268]	2695	[2790, 617]
533	[887, 78]	1254	[1632, 115]	1975	[2269, 1707]	2696	[2791, 1125]
534	[872, 888]	1255	[1633, 970]	1976	[408, 1664]	2697	[2792, 45]
535	[16, 836]	1256	[1634, 969]	1977	[2270, 270]	2698	[2793, 2126]
536	[20, 297]	1257	[1635, 1636]	1978	[1600, 1738]	2699	[2794, 1133]
537	[889, 890]	1258	[1637, 771]	1979	[2271, 1068]	2700	[2795, 1477]
538	[891, 892]	1259	[1638, 1639]	1980	[2272, 1835]	2701	[2796, 224]
539	[893, 271]	1260	[863, 1087]	1981	[899, 2273]	2702	[2797, 662]
540	[894, 895]	1261	[1529, 753]	1982	[2274, 2275]	2703	[2798, 551]
541	[896, 897]	1262	[1640, 1050]	1983	[2276, 1574]	2704	[2799, 1154]
542	[18, 386]	1263	[1641, 893]	1984	[2277, 76]	2705	[2800, 2028]
543	[898, 851]	1264	[1642, 357]	1985	[930, 2278]	2706	[2801, 655]
544	[841, 899]	1265	[408, 1524]	1986	[1585, 818]	2707	[2802, 529]
545	[900, 901]	1266	[84, 1643]	1987	[2279, 295]	2708	[2803, 1251]
546	[902, 903]	1267	[1644, 1645]	1988	[2280, 409]	2709	[2804, 467]
547	[68, 322]	1268	[1646, 246]	1989	[2281, 330]	2710	[2805, 139]
548	[904, 905]	1269	[1647, 89]	1990	[882, 928]	2711	[2806, 642]
549	[906, 359]	1270	[1648, 318]	1991	[411, 2172]	2712	[2807, 1405]
550	[907, 908]	1271	[1649, 1650]	1992	[2282, 1030]	2713	[2808, 1142]
551	[909, 252]	1272	[1594, 1100]	1993	[2204, 2283]	2714	[2809, 449]
552	[910, 821]	1273	[1577, 338]	1994	[2284, 2285]	2715	[2810, 559]
553	[911, 912]	1274	[820, 1651]	1995	[2286, 108]	2716	[2811, 1132]
554	[880, 913]	1275	[1652, 1653]	1996	[2287, 763]	2717	[289, 2268]
555	[914, 915]	1276	[1654, 930]	1997	[1542, 2288]	2718	[2654, 1717]
556	[916, 917]	1277	[1655, 411]	1998	[2197, 1760]	2719	[2713, 2812]
557	[918, 919]	1278	[902, 1656]	1999	[1615, 2289]	2720	[2813, 2628]
558	[920, 109]	1279	[1657, 277]	2000	[2290, 2189]	2721	[1683, 2285]
559	[921, 113]	1280	[1658, 910]	2001	[2291, 361]	2722	[2383, 1622]
560	[922, 923]	1281	[1659, 1597]	2002	[2292, 1065]	2723	[872, 395]
561	[924, 925]	1282	[1660, 1661]	2003	[306, 283]	2724	[1749, 2685]
562	[833, 845]	1283	[1662, 1045]	2004	[281, 1728]	2725	[2814, 2815]
563	[926, 122]	1284	[1663, 1034]	2005	[2293, 2294]	2726	[1821, 907]
564	[336, 927]	1285	[1523, 1664]	2006	[2295, 2296]	2727	[1804, 778]
565	[305, 315]	1286	[1644, 1665]	2007	[2297, 2219]	2728	[2652, 1114]
566	[928, 748]	1287	[1666, 796]	2008	[2298, 376]	2729	[2678, 2816]

567	[929, 930]	1288	[1077, 101]	2009	[2299, 1511]	2730	[2817, 2818]
568	[931, 336]	1289	[381, 1667]	2010	[316, 2300]	2731	[962, 1025]
569	[932, 933]	1290	[1668, 1647]	2011	[2301, 811]	2732	[2181, 347]
570	[934, 935]	1291	[1669, 965]	2012	[2302, 79]	2733	[2299, 1549]
571	[936, 937]	1292	[870, 1670]	2013	[1086, 2303]	2734	[2819, 2716]
572	[938, 880]	1293	[1671, 1672]	2014	[2304, 2305]	2735	[1669, 959]
573	[939, 940]	1294	[1673, 1561]	2015	[2306, 2307]	2736	[1679, 857]
574	[941, 942]	1295	[1674, 1675]	2016	[1020, 875]	2737	[2820, 752]
575	[943, 944]	1296	[349, 410]	2017	[2308, 2309]	2738	[2821, 2661]
576	[945, 747]	1297	[1676, 265]	2018	[1802, 2310]	2739	[2822, 2679]
577	[946, 342]	1298	[1677, 1493]	2019	[2311, 948]	2740	[2381, 2329]
578	[894, 947]	1299	[1678, 343]	2020	[2312, 897]	2741	[2234, 266]
579	[948, 29]	1300	[1679, 982]	2021	[248, 2313]	2742	[2274, 2823]
580	[949, 950]	1301	[778, 1628]	2022	[2314, 2315]	2743	[2824, 1082]
581	[951, 952]	1302	[1680, 776]	2023	[1552, 2316]	2744	[2825, 2338]
582	[953, 77]	1303	[74, 937]	2024	[735, 1097]	2745	[95, 1686]
583	[954, 955]	1304	[1681, 1682]	2025	[1751, 746]	2746	[2375, 1580]
584	[956, 957]	1305	[1683, 1684]	2026	[2317, 1508]	2747	[325, 900]
585	[958, 933]	1306	[1685, 1686]	2027	[2318, 1656]	2748	[1583, 1602]
586	[959, 960]	1307	[1687, 1563]	2028	[2268, 775]	2749	[1700, 395]
587	[284, 961]	1308	[1688, 1558]	2029	[2319, 280]	2750	[106, 1019]
588	[962, 934]	1309	[1623, 1689]	2030	[2320, 912]	2751	[2826, 2827]
589	[963, 964]	1310	[1033, 293]	2031	[2321, 2322]	2752	[2378, 314]
590	[965, 960]	1311	[1690, 1099]	2032	[2323, 2324]	2753	[2684, 1750]
591	[966, 405]	1312	[1691, 1575]	2033	[1504, 1811]	2754	[2644, 886]
592	[967, 282]	1313	[1692, 1693]	2034	[783, 1558]	2755	[2828, 2663]
593	[385, 968]	1314	[1694, 1670]	2035	[30, 2325]	2756	[1592, 350]
594	[969, 970]	1315	[1695, 1519]	2036	[2326, 1843]	2757	[2704, 376]
595	[847, 971]	1316	[1696, 424]	2037	[2327, 1801]	2758	[391, 2273]
596	[972, 774]	1317	[299, 1509]	2038	[2173, 1583]	2759	[304, 314]
597	[973, 105]	1318	[1697, 1679]	2039	[2328, 2329]	2760	[2829, 2322]
598	[974, 787]	1319	[1698, 792]	2040	[2207, 1063]	2761	[2830, 2714]
599	[936, 975]	1320	[1645, 1699]	2041	[1685, 96]	2762	[1839, 1631]
600	[976, 294]	1321	[1700, 888]	2042	[2330, 1633]	2763	[2295, 2689]
601	[977, 978]	1322	[282, 1701]	2043	[2331, 2332]	2764	[2710, 2697]
602	[979, 289]	1323	[1702, 1703]	2044	[424, 855]	2765	[108, 805]
603	[980, 981]	1324	[1704, 1705]	2045	[2333, 1784]	2766	[1698, 1038]
604	[982, 241]	1325	[1706, 1707]	2046	[1641, 1100]	2767	[1702, 2642]
605	[983, 30]	1326	[1708, 865]	2047	[326, 1832]	2768	[2667, 2221]
606	[984, 404]	1327	[1709, 1117]	2048	[2334, 91]	2769	[1634, 1633]
607	[734, 985]	1328	[1710, 1711]	2049	[2335, 65]	2770	[407, 1523]
608	[736, 260]	1329	[1712, 1713]	2050	[1082, 928]	2771	[2831, 2668]
609	[986, 987]	1330	[1561, 1714]	2051	[2336, 427]	2772	[2357, 421]
610	[71, 988]	1331	[1497, 1715]	2052	[2258, 1076]	2773	[2323, 2673]

611	[64, 989]	1332	[1716, 1717]	2053	[848, 1572]	2774	[2709, 1622]
612	[280, 298]	1333	[1718, 1719]	2054	[2337, 1682]	2775	[2813, 2631]
613	[990, 791]	1334	[98, 984]	2055	[422, 2325]	2776	[262, 2344]
614	[991, 899]	1335	[1717, 1571]	2056	[2176, 2338]	2777	[904, 2832]
615	[262, 992]	1336	[1720, 124]	2057	[2339, 2340]	2778	[2335, 1631]
616	[993, 994]	1337	[74, 975]	2058	[101, 2341]	2779	[2339, 2833]
617	[868, 303]	1338	[1721, 1698]	2059	[2342, 1856]	2780	[2393, 988]
618	[92, 870]	1339	[1722, 872]	2060	[2343, 318]	2781	[974, 1003]
619	[995, 859]	1340	[1723, 1576]	2061	[831, 2344]	2782	[757, 2230]
620	[883, 748]	1341	[1724, 1514]	2062	[2345, 973]	2783	[2655, 2256]
621	[996, 997]	1342	[1725, 768]	2063	[2310, 1538]	2784	[2369, 1663]
622	[998, 275]	1343	[892, 375]	2064	[1528, 2346]	2785	[2255, 2656]
623	[337, 999]	1344	[1038, 1726]	2065	[2347, 828]	2786	[2672, 2324]
624	[1000, 1001]	1345	[1727, 1506]	2066	[1833, 427]	2787	[2236, 2701]
625	[1002, 799]	1346	[1728, 1046]	2067	[1721, 1618]	2788	[2231, 1772]
626	[1003, 812]	1347	[899, 392]	2068	[2348, 950]	2789	[1608, 100]
627	[1004, 808]	1348	[1595, 267]	2069	[2349, 967]	2790	[2331, 2683]
628	[1005, 278]	1349	[1729, 913]	2070	[300, 1615]	2791	[323, 2827]
629	[1006, 388]	1350	[1730, 1731]	2071	[1805, 1523]	2792	[1775, 1114]
630	[1007, 112]	1351	[1732, 1714]	2072	[2350, 858]	2793	[2834, 2626]
631	[265, 744]	1352	[1733, 785]	2073	[888, 396]	2794	[2676, 2403]
632	[1008, 1009]	1353	[280, 952]	2074	[5, 2351]	2795	[2261, 2665]
633	[107, 1010]	1354	[1734, 123]	2075	[2352, 954]	2796	[2821, 944]
634	[833, 1011]	1355	[1735, 330]	2076	[920, 805]	2797	[2712, 2351]
635	[1012, 1013]	1356	[1049, 92]	2077	[359, 2353]	2798	[867, 302]
636	[1014, 968]	1357	[1736, 1737]	2078	[1509, 2346]	2799	[1030, 789]
637	[1015, 413]	1358	[1738, 387]	2079	[2354, 2355]	2800	[2835, 2340]
638	[1016, 1017]	1359	[1739, 309]	2080	[1089, 2278]	2801	[2836, 2823]
639	[1018, 247]	1360	[1740, 773]	2081	[2311, 364]	2802	[2380, 327]
640	[1019, 1010]	1361	[1741, 929]	2082	[310, 1500]	2803	[1001, 1097]
641	[1020, 1021]	1362	[1491, 369]	2083	[2356, 1113]	2804	[1584, 794]
642	[1022, 1023]	1363	[1742, 1636]	2084	[2357, 365]	2805	[2837, 2659]
643	[1024, 964]	1364	[414, 350]	2085	[2318, 903]	2806	[2194, 907]
644	[1025, 935]	1365	[1743, 1115]	2086	[2358, 1027]	2807	[2830, 2812]
645	[1026, 118]	1366	[1744, 122]	2087	[69, 1768]	2808	[2819, 2703]
646	[1027, 390]	1367	[1745, 866]	2088	[2359, 2360]	2809	[837, 1663]
647	[989, 761]	1368	[1746, 752]	2089	[2361, 965]	2810	[18, 1738]
648	[1028, 22]	1369	[1747, 418]	2090	[2362, 938]	2811	[2715, 815]
649	[1029, 1023]	1370	[403, 97]	2091	[1808, 2363]	2812	[2838, 605]
650	[1030, 310]	1371	[1748, 890]	2092	[2364, 2365]	2813	[2839, 1226]
651	[1031, 1032]	1372	[1749, 1750]	2093	[2366, 1554]	2814	[2840, 1173]
652	[1033, 976]	1373	[1751, 945]	2094	[2367, 1845]	2815	[2841, 606]
653	[838, 1034]	1374	[1752, 1737]	2095	[2368, 875]	2816	[2842, 503]
654	[1035, 1036]	1375	[1753, 1509]	2096	[2369, 838]	2817	[2843, 1920]

655	[811, 359]	1376	[243, 1754]	2097	[978, 248]	2818	[2844, 1156]
656	[812, 833]	1377	[830, 262]	2098	[2370, 798]	2819	[2845, 1155]
657	[1037, 340]	1378	[1755, 1756]	2099	[804, 380]	2820	[2846, 665]
658	[1038, 793]	1379	[1757, 1758]	2100	[2371, 393]	2821	[2847, 1250]
659	[1039, 804]	1380	[1759, 1546]	2101	[398, 866]	2822	[2848, 1281]
660	[1040, 825]	1381	[1760, 880]	2102	[2372, 379]	2823	[2849, 594]
661	[1041, 108]	1382	[1612, 800]	2103	[1780, 2373]	2824	[2850, 144]
662	[930, 1042]	1383	[1761, 864]	2104	[2374, 106]	2825	[2851, 1187]
663	[843, 1043]	1384	[1762, 1756]	2105	[2375, 734]	2826	[2852, 1876]
664	[1044, 1045]	1385	[1763, 1536]	2106	[966, 2341]	2827	[2853, 137]
665	[795, 82]	1386	[1764, 1765]	2107	[1056, 2353]	2828	[2854, 1167]
666	[282, 1046]	1387	[1766, 773]	2108	[2376, 882]	2829	[2855, 154]
667	[1047, 288]	1388	[1767, 998]	2109	[874, 2377]	2830	[2856, 1273]
668	[1048, 1049]	1389	[329, 1768]	2110	[2378, 305]	2831	[2857, 1330]
669	[1050, 1051]	1390	[1769, 1770]	2111	[2374, 743]	2832	[2858, 1180]
670	[1052, 1031]	1391	[1771, 1772]	2112	[1000, 735]	2833	[2859, 481]
671	[72, 1053]	1392	[1710, 1773]	2113	[2379, 1548]	2834	[2860, 212]
672	[353, 841]	1393	[1774, 418]	2114	[1531, 2241]	2835	[2861, 1212]
673	[1054, 848]	1394	[1775, 1743]	2115	[1782, 1047]	2836	[2862, 1922]
674	[1055, 264]	1395	[1776, 764]	2116	[2380, 763]	2837	[2863, 1478]
675	[1056, 360]	1396	[351, 1777]	2117	[264, 2377]	2838	[2686, 995]
676	[1057, 1058]	1397	[1778, 1779]	2118	[2381, 2382]	2839	[2354, 2818]
677	[1059, 765]	1398	[1780, 749]	2119	[788, 823]	2840	[2864, 2254]
678	[947, 1060]	1399	[1781, 385]	2120	[2383, 258]	2841	[2865, 1773]
679	[981, 243]	1400	[1699, 847]	2121	[2384, 767]	2842	[2245, 389]
680	[1061, 1062]	1401	[1068, 1086]	2122	[2385, 1594]	2843	[2866, 2705]
681	[1063, 94]	1402	[1782, 287]	2123	[2386, 1040]	2844	[2825, 2177]
682	[1064, 971]	1403	[1783, 1784]	2124	[2364, 2387]	2845	[2835, 2833]
683	[1065, 310]	1404	[1785, 277]	2125	[2308, 2388]	2846	[1054, 800]
684	[1066, 994]	1405	[831, 992]	2126	[1559, 1673]	2847	[2867, 2622]
685	[1067, 388]	1406	[947, 1605]	2127	[989, 2200]	2848	[2822, 2816]
686	[1068, 863]	1407	[266, 745]	2128	[2389, 407]	2849	[1553, 2638]
687	[1069, 1070]	1408	[1786, 245]	2129	[2390, 420]	2850	[811, 1056]
688	[806, 776]	1409	[1787, 1788]	2130	[2391, 826]	2851	[2868, 1715]
689	[1071, 1072]	1410	[1789, 738]	2131	[1526, 2211]	2852	[2869, 2637]
690	[1073, 993]	1411	[1790, 924]	2132	[2392, 93]	2853	[2829, 2650]
691	[1074, 797]	1412	[1791, 1110]	2133	[1851, 16]	2854	[2192, 2815]
692	[1075, 879]	1413	[1792, 927]	2134	[2334, 1049]	2855	[2870, 2832]
693	[895, 1060]	1414	[1793, 1071]	2135	[2393, 72]	2856	[2635, 2407]
694	[1076, 1077]	1415	[399, 813]	2136	[1760, 1729]	2857	[2871, 2363]
695	[1078, 908]	1416	[1794, 1643]	2137	[863, 2303]	2858	[2179, 2707]
696	[1079, 110]	1417	[870, 1795]	2138	[2394, 365]	2859	[1797, 815]
697	[1080, 89]	1418	[1499, 120]	2139	[1599, 2395]	2860	[2696, 2711]
698	[1081, 925]	1419	[1796, 1765]	2140	[2343, 1804]	2861	[1844, 2624]

699	[1082, 883]	1420	[417, 856]	2141	[1594, 893]	2862	[2314, 2649]
700	[1083, 265]	1421	[1797, 382]	2142	[1566, 1068]	2863	[2872, 2283]
701	[759, 947]	1422	[1618, 792]	2143	[910, 1651]	2864	[2873, 1296]
702	[1084, 1085]	1423	[290, 1798]	2144	[2396, 934]	2865	[2874, 219]
703	[745, 892]	1424	[1746, 1529]	2145	[1069, 794]	2866	[2875, 2063]
704	[1086, 1087]	1425	[1609, 337]	2146	[402, 80]	2867	[2876, 1307]
705	[1088, 394]	1426	[1799, 238]	2147	[354, 2397]	2868	[2877, 1324]
706	[1089, 1042]	1427	[1800, 1801]	2148	[2398, 2399]	2869	[2878, 224]
707	[1090, 1091]	1428	[757, 1603]	2149	[2400, 2401]	2870	[2879, 1351]
708	[294, 345]	1429	[769, 307]	2150	[2402, 2403]	2871	[2880, 137]
709	[1092, 1050]	1430	[1802, 1537]	2151	[756, 1602]	2872	[2881, 1156]
710	[1093, 1043]	1431	[1803, 1536]	2152	[836, 2203]	2873	[2402, 2677]
711	[1094, 69]	1432	[1804, 319]	2153	[1014, 371]	2874	[1610, 2699]
712	[818, 26]	1433	[1805, 408]	2154	[2404, 1568]	2875	[2284, 1684]
713	[1095, 911]	1434	[1806, 428]	2155	[2405, 998]	2876	[2411, 2401]
714	[1096, 766]	1435	[25, 819]	2156	[2406, 2407]	2877	[780, 1672]
715	[1097, 260]	1436	[1616, 63]	2157	[2358, 389]	2878	[2643, 2387]
716	[1098, 1099]	1437	[107, 1807]	2158	[1022, 885]	2879	[1501, 2175]
717	[1100, 271]	1438	[1808, 1809]	2159	[2408, 1006]	2880	[2828, 2634]
718	[921, 1101]	1439	[1810, 1811]	2160	[112, 1101]	2881	[2865, 1711]
719	[109, 806]	1440	[1812, 1661]	2161	[752, 877]		
720	[939, 1102]	1441	[1813, 406]	2162	[1728, 1701]		

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	481	0	962	0	1443	0	1924	1	2405	0
1	0	482	0	963	0	1444	1	1925	1	2406	0
2	0	483	1	964	0	1445	0	1926	1	2407	1
3	0	484	1	965	1	1446	1	1927	0	2408	1
4	0	485	0	966	0	1447	1	1928	0	2409	0
5	0	486	1	967	1	1448	1	1929	0	2410	1
6	0	487	0	968	1	1449	1	1930	0	2411	1
7	0	488	0	969	1	1450	1	1931	0	2412	1
8	0	489	0	970	0	1451	1	1932	0	2413	0
9	0	490	0	971	1	1452	1	1933	1	2414	0
10	1	491	0	972	1	1453	1	1934	0	2415	0
11	0	492	1	973	0	1454	0	1935	1	2416	0
12	0	493	1	974	1	1455	1	1936	1	2417	0
13	0	494	0	975	1	1456	0	1937	1	2418	0
14	0	495	1	976	1	1457	1	1938	0	2419	1
15	0	496	1	977	1	1458	1	1939	1	2420	1
16	1	497	0	978	1	1459	1	1940	0	2421	0
17	0	498	1	979	0	1460	1	1941	0	2422	1
18	1	499	1	980	0	1461	0	1942	1	2423	1

19	0	500	1	981	0	1462	1	1943	0	2424	0
20	1	501	0	982	0	1463	0	1944	0	2425	0
21	1	502	1	983	1	1464	1	1945	1	2426	0
22	0	503	0	984	0	1465	1	1946	0	2427	1
23	0	504	1	985	0	1466	0	1947	1	2428	0
24	0	505	1	986	0	1467	0	1948	1	2429	0
25	0	506	0	987	0	1468	1	1949	0	2430	1
26	1	507	1	988	0	1469	1	1950	0	2431	0
27	0	508	1	989	0	1470	1	1951	0	2432	1
28	1	509	0	990	1	1471	1	1952	0	2433	0
29	0	510	1	991	1	1472	1	1953	0	2434	1
30	1	511	1	992	0	1473	1	1954	0	2435	1
31	0	512	0	993	0	1474	0	1955	1	2436	0
32	1	513	1	994	0	1475	0	1956	1	2437	0
33	1	514	0	995	1	1476	0	1957	0	2438	1
34	0	515	0	996	0	1477	0	1958	0	2439	1
35	0	516	0	997	0	1478	1	1959	1	2440	1
36	0	517	1	998	1	1479	1	1960	0	2441	0
37	1	518	0	999	1	1480	1	1961	1	2442	1
38	1	519	0	1000	0	1481	1	1962	1	2443	1
39	0	520	1	1001	1	1482	0	1963	1	2444	1
40	0	521	1	1002	1	1483	0	1964	0	2445	1
41	1	522	1	1003	1	1484	1	1965	0	2446	0
42	1	523	0	1004	0	1485	1	1966	0	2447	0
43	1	524	0	1005	0	1486	1	1967	0	2448	0
44	0	525	1	1006	1	1487	0	1968	1	2449	1
45	0	526	1	1007	1	1488	1	1969	0	2450	1
46	1	527	0	1008	1	1489	0	1970	1	2451	1
47	0	528	1	1009	1	1490	0	1971	1	2452	0
48	0	529	0	1010	0	1491	0	1972	0	2453	0
49	0	530	1	1011	1	1492	0	1973	1	2454	0
50	0	531	0	1012	0	1493	0	1974	1	2455	1
51	0	532	0	1013	1	1494	0	1975	0	2456	1
52	1	533	0	1014	1	1495	0	1976	0	2457	0
53	1	534	0	1015	1	1496	1	1977	0	2458	0
54	1	535	1	1016	0	1497	0	1978	0	2459	0
55	0	536	1	1017	0	1498	0	1979	0	2460	0
56	0	537	1	1018	1	1499	1	1980	0	2461	1
57	1	538	1	1019	1	1500	0	1981	1	2462	1
58	0	539	1	1020	1	1501	1	1982	1	2463	0
59	0	540	1	1021	0	1502	1	1983	0	2464	1
60	0	541	0	1022	1	1503	1	1984	0	2465	1
61	1	542	1	1023	1	1504	0	1985	0	2466	1
62	1	543	0	1024	1	1505	1	1986	1	2467	0

63	0	544	0	1025	0	1506	0	1987	0	2468	0
64	1	545	0	1026	1	1507	0	1988	0	2469	0
65	1	546	0	1027	1	1508	0	1989	0	2470	1
66	1	547	1	1028	0	1509	0	1990	0	2471	0
67	1	548	0	1029	0	1510	0	1991	1	2472	1
68	1	549	0	1030	1	1511	1	1992	0	2473	0
69	0	550	1	1031	0	1512	1	1993	1	2474	1
70	0	551	0	1032	0	1513	0	1994	1	2475	1
71	0	552	1	1033	1	1514	0	1995	1	2476	0
72	1	553	0	1034	1	1515	1	1996	0	2477	0
73	0	554	1	1035	1	1516	1	1997	1	2478	1
74	0	555	0	1036	0	1517	1	1998	0	2479	1
75	1	556	1	1037	0	1518	1	1999	0	2480	0
76	0	557	1	1038	1	1519	0	2000	0	2481	0
77	1	558	0	1039	1	1520	0	2001	1	2482	1
78	1	559	1	1040	1	1521	0	2002	1	2483	1
79	0	560	1	1041	0	1522	0	2003	0	2484	1
80	0	561	0	1042	1	1523	1	2004	0	2485	0
81	0	562	0	1043	0	1524	1	2005	0	2486	1
82	1	563	0	1044	1	1525	0	2006	1	2487	0
83	1	564	1	1045	0	1526	1	2007	0	2488	0
84	0	565	0	1046	1	1527	1	2008	0	2489	0
85	1	566	0	1047	0	1528	1	2009	0	2490	1
86	1	567	0	1048	0	1529	1	2010	1	2491	0
87	1	568	1	1049	1	1530	0	2011	1	2492	1
88	1	569	0	1050	1	1531	1	2012	0	2493	1
89	0	570	1	1051	1	1532	0	2013	0	2494	0
90	1	571	1	1052	0	1533	0	2014	0	2495	0
91	0	572	0	1053	0	1534	1	2015	0	2496	0
92	0	573	1	1054	1	1535	0	2016	1	2497	0
93	1	574	1	1055	1	1536	1	2017	1	2498	1
94	0	575	0	1056	1	1537	1	2018	0	2499	0
95	0	576	1	1057	0	1538	1	2019	0	2500	0
96	1	577	0	1058	1	1539	1	2020	1	2501	0
97	0	578	1	1059	0	1540	0	2021	1	2502	0
98	0	579	0	1060	1	1541	1	2022	0	2503	0
99	1	580	0	1061	0	1542	1	2023	0	2504	0
100	0	581	0	1062	1	1543	1	2024	0	2505	1
101	1	582	1	1063	0	1544	1	2025	0	2506	1
102	0	583	1	1064	0	1545	0	2026	1	2507	0
103	1	584	1	1065	0	1546	1	2027	1	2508	1
104	1	585	1	1066	1	1547	0	2028	0	2509	0
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237	0	718	1	1199	0	1680	0	2161	0	2642	1
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239	0	720	1	1201	1	1682	0	2163	0	2644	1
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242	0	723	1	1204	1	1685	1	2166	0	2647	1
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249	1	730	0	1211	0	1692	1	2173	0	2654	1
250	1	731	1	1212	1	1693	0	2174	0	2655	0
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253	1	734	0	1215	0	1696	0	2177	0	2658	1
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257	0	738	0	1219	0	1700	1	2181	1	2662	0
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326	1	807	1	1288	1	1769	1	2250	1	2731	0

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381	0	862	0	1343	0	1824	0	2305	0	2786	1
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383	0	864	1	1345	0	1826	1	2307	1	2788	1
384	0	865	1	1346	1	1827	1	2308	1	2789	1
385	0	866	0	1347	1	1828	1	2309	1	2790	1
386	0	867	0	1348	0	1829	1	2310	0	2791	1
387	0	868	0	1349	0	1830	1	2311	0	2792	1
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389	0	870	0	1351	0	1832	0	2313	0	2794	0
390	1	871	1	1352	1	1833	1	2314	0	2795	0
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393	0	874	0	1355	1	1836	1	2317	1	2798	0
394	0	875	1	1356	1	1837	0	2318	1	2799	1
395	1	876	1	1357	1	1838	1	2319	1	2800	0
396	1	877	1	1358	1	1839	1	2320	1	2801	0
397	1	878	0	1359	1	1840	1	2321	0	2802	1
398	1	879	1	1360	0	1841	1	2322	0	2803	1
399	1	880	1	1361	1	1842	1	2323	0	2804	0
400	1	881	0	1362	0	1843	0	2324	1	2805	0
401	0	882	0	1363	1	1844	0	2325	1	2806	0
402	1	883	1	1364	1	1845	0	2326	0	2807	1
403	1	884	1	1365	1	1846	0	2327	0	2808	0
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405	0	886	0	1367	0	1848	1	2329	1	2810	1
406	0	887	0	1368	0	1849	1	2330	1	2811	1
407	1	888	0	1369	0	1850	1	2331	1	2812	1
408	0	889	1	1370	1	1851	1	2332	1	2813	0
409	0	890	1	1371	0	1852	1	2333	1	2814	1
410	0	891	1	1372	0	1853	0	2334	1	2815	0
411	1	892	0	1373	0	1854	0	2335	0	2816	1
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413	0	894	1	1375	1	1856	0	2337	1	2818	1
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417	1	898	0	1379	1	1860	1	2341	1	2822	1
418	1	899	1	1380	1	1861	0	2342	0	2823	1
419	1	900	0	1381	1	1862	1	2343	1	2824	1
420	1	901	1	1382	0	1863	0	2344	1	2825	1
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423	0	904	0	1385	0	1866	0	2347	0	2828	0
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456	0	937	0	1418	1	1899	1	2380	1	2861	0
457	1	938	0	1419	1	1900	1	2381	0	2862	0
458	0	939	1	1420	1	1901	0	2382	0	2863	0

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475	0	956	1	1437	0	1918	0	2399	1	2880	0
476	1	957	1	1438	1	1919	1	2400	0	2881	0
477	1	958	1	1439	1	1920	0	2401	0		
478	1	959	0	1440	0	1921	0	2402	1		
479	0	960	0	1441	1	1922	0	2403	0		
480	0	961	0	1442	0	1923	0	2404	1		

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