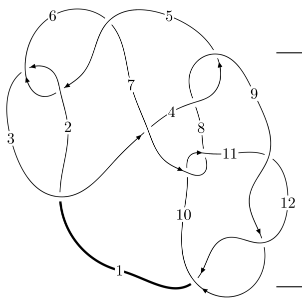
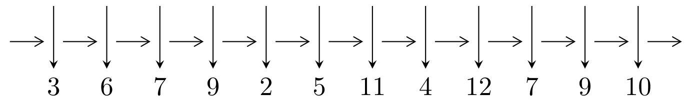
# $12n_{0292}$ ($K12n_{0292}$)




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

$$4,9 \xrightarrow[c_4]{} 5,11 \xrightarrow[c_{11}]{} 12 \xrightarrow[c_9]{} 10 \xrightarrow[c_{12}]{} 1 \xrightarrow[c_8]{} 8 \xrightarrow[c_7]{} 7 \xrightarrow[c_3]{} 3 \xrightarrow[c_6]{} 6 \xrightarrow[c_2]{} 2 \twoheadrightarrow c_1, c_5, c_{10}$$

**Ideals for irreducible components[2] of $X_{\mathbf{par}}$**

$$\begin{aligned} I_1^u = \langle & -3.88782 \times 10^{23} u^{13} - 5.12763 \times 10^{24} u^{12} + \cdots + 2.64685 \times 10^{25} b + 6.25813 \times 10^{25}, \\ & 7.50387 \times 10^{22} u^{13} + 1.45176 \times 10^{23} u^{12} + \cdots + 5.29369 \times 10^{25} a + 2.07299 \times 10^{26}, \\ & u^{14} + 13u^{13} + \cdots - 32u + 64 \rangle \\ I_2^u = \langle & u^7 + u^6 - 3u^5 - 2u^4 + 3u^3 + b + 2,\ u^7 + u^6 - 3u^5 - 2u^4 + 3u^3 + a + 2,\ u^8 + u^7 - 3u^6 - 2u^5 + 3u^4 + 2u - \end{aligned}$$

$$I_1^v = \langle a,\ 251v^5 + 1517v^4 + 2839v^3 + 6155v^2 + 413b + 3834v + 768,\ v^6 + 6v^5 + 11v^4 + 24v^3 + 15v^2 + 3v + 1 \rangle$$

* 3 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 28 representations.

[1]The image of knot diagram is generated by the software "**Draw programme**" developed by Andrew Bartholomew(`http://www.layer8.co.uk/maths/draw/index.htm#Running-draw`), where we modified some parts for our purpose(`https://github.com/CATsTAILs/LinksPainter`).

[2]All coefficients of polynomials are rational numbers. But the coefficients are sometimes approximated in decimal forms when there is not enough margin.

**I.** $\boldsymbol{I_1^u = \langle -3.89 \times 10^{23}u^{13} - 5.13 \times 10^{24}u^{12} + \cdots + 2.65 \times 10^{25}b + 6.26 \times 10^{25},\ 7.50 \times 10^{22}u^{13} + 1.45 \times 10^{23}u^{12} + \cdots + 5.29 \times 10^{25}a + 2.07 \times 10^{26},\ u^{14} + 13u^{13} + \cdots - 32u + 64\rangle}$

**(i) Arc colorings**

$$a_4 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_9 = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_5 = \begin{pmatrix}1\\u^2\end{pmatrix}$$
$$a_{11} = \begin{pmatrix}-0.00141751u^{13} - 0.00274243u^{12} + \cdots - 2.48245u - 3.91596\\ 0.0146885u^{13} + 0.193726u^{12} + \cdots - 5.56422u - 2.36437\end{pmatrix}$$
$$a_{12} = \begin{pmatrix}-0.00141751u^{13} - 0.00274243u^{12} + \cdots - 2.48245u - 3.91596\\ 0.0101820u^{13} + 0.140392u^{12} + \cdots - 4.97157u - 3.36822\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}-0.00113062u^{13} - 0.0125080u^{12} + \cdots - 2.90912u - 1.42506\\ 0.0142858u^{13} + 0.186357u^{12} + \cdots - 5.61762u - 1.88242\end{pmatrix}$$
$$a_1 = \begin{pmatrix}-0.0210436u^{13} - 0.266521u^{12} + \cdots + 3.80828u - 0.914411\\ -0.0113459u^{13} - 0.139334u^{12} + \cdots + 2.52961u - 1.68257\end{pmatrix}$$
$$a_8 = \begin{pmatrix}u\\u\end{pmatrix}$$
$$a_7 = \begin{pmatrix}0.0181604u^{13} + 0.234062u^{12} + \cdots - 2.85095u - 0.317190\\ -0.00288324u^{13} - 0.0324588u^{12} + \cdots + 0.957338u - 1.23160\end{pmatrix}$$
$$a_3 = \begin{pmatrix}-0.00413905u^{13} - 0.0558999u^{12} + \cdots + 0.679785u + 1.52829\\ -0.00466437u^{13} - 0.0566994u^{12} + \cdots + 0.968533u - 0.525572\end{pmatrix}$$
$$a_6 = \begin{pmatrix}0.00922038u^{13} + 0.124297u^{12} + \cdots - 0.666608u - 1.67826\\ -0.00752145u^{13} - 0.0902797u^{12} + \cdots + 1.73607u - 1.64474\end{pmatrix}$$
$$a_2 = \begin{pmatrix}-0.0194805u^{13} - 0.252321u^{12} + \cdots + 2.53552u + 0.574034\\ -0.0151718u^{13} - 0.187049u^{12} + \cdots + 2.63035u - 1.84661\end{pmatrix}$$

**(ii) Obstruction class** $= -1$

**(iii) Cusp Shapes** $= \frac{6397031736972176627304075}{26468471689247551065891424}u^{13} + \frac{8573510518651057741150666 9}{26468471689247551065891424}u^{12} + \cdots - \frac{11400421471955549651701567 7}{8271397402889859708091 07}u - \frac{55506637637800758601432107}{827139740288985970809107}$

**(iv) u-Polynomials at the component**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_6$ | $u^{14} + 9u^{13} + \cdots + 16u + 1$ |
| $c_2, c_5$ | $u^{14} + 3u^{13} + \cdots + 8u + 1$ |
| $c_3$ | $u^{14} - 61u^{13} + \cdots + 58652u + 7489$ |
| $c_4, c_8$ | $u^{14} + 13u^{13} + \cdots - 32u + 64$ |
| $c_7, c_{10}$ | $u^{14} + 41u^{13} + \cdots - 640u + 256$ |
| $c_9, c_{11}, c_{12}$ | $u^{14} - 21u^{13} + \cdots + 17u + 1$ |

**(v) Riley Polynomials at the component**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_6$ | $y^{14} - 13y^{13} + \cdots - 32y + 1$ |
| $c_2, c_5$ | $y^{14} - 9y^{13} + \cdots - 16y + 1$ |
| $c_3$ | $y^{14} - 3381y^{13} + \cdots - 1276544916y + 56085121$ |
| $c_4, c_8$ | $y^{14} - 339y^{13} + \cdots - 62464y + 4096$ |
| $c_7, c_{10}$ | $y^{14} - 1029y^{13} + \cdots - 2539520y + 65536$ |
| $c_9, c_{11}, c_{12}$ | $y^{14} - 121y^{13} + \cdots - 57y + 1$ |

**(vi) Complex Volumes and Cusp Shapes**

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.615322 + 0.027933I$<br>$a = 0.270955 + 0.334290I$<br>$b = -0.491780 - 0.018263I$ | $-0.755939 - 0.001558I$ | $-11.59104 + 0.05980I$ |
| $u = -0.615322 - 0.027933I$<br>$a = 0.270955 - 0.334290I$<br>$b = -0.491780 + 0.018263I$ | $-0.755939 + 0.001558I$ | $-11.59104 - 0.05980I$ |
| $u = 0.009870 + 0.545956I$<br>$a = -0.167508 + 0.354571I$<br>$b = -0.343156 + 1.170610I$ | $2.39955 + 2.72347I$ | $-2.27719 - 1.42875I$ |
| $u = 0.009870 - 0.545956I$<br>$a = -0.167508 - 0.354571I$<br>$b = -0.343156 - 1.170610I$ | $2.39955 - 2.72347I$ | $-2.27719 + 1.42875I$ |
| $u = 0.538862$<br>$a = 2.91010$<br>$b = 0.103022$ | $-10.2297$ | $-34.5740$ |
| $u = -0.527756$<br>$a = 0.348493$<br>$b = -0.450251$ | $-0.765092$ | $-12.2670$ |
| $u = 0.328130$<br>$a = -2.96230$<br>$b = -3.66807$ | $-2.58775$ | $-102.750$ |
| $u = 2.36859 + 0.76389I$<br>$a = 0.286166 - 0.684183I$<br>$b = 0.464252 + 0.349923I$ | $-3.81801 - 4.65772I$ | $-14.3487 + 2.2929I$ |
| $u = 2.36859 - 0.76389I$<br>$a = 0.286166 + 0.684183I$<br>$b = 0.464252 - 0.349923I$ | $-3.81801 + 4.65772I$ | $-14.3487 - 2.2929I$ |
| $u = -1.88270 + 1.66535I$<br>$a = -0.845008 - 0.271270I$<br>$b = -2.08577 - 0.29493I$ | $15.9880 + 11.7884I$ | $-14.3165 - 4.7631I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.88270-1.66535I$<br>$a=-0.845008+0.271270I$<br>$b=-2.08577+0.29493I$ | $15.9880-11.7884I$ | $-14.3165+4.7631I$ |
| $u=\ \ 2.40458+1.69377I$<br>$a=\ \ 0.839800-0.202162I$<br>$b=\ \ 2.14114-0.18650I$ | $17.5291-4.7891I$ | $-13.20379+0.61326I$ |
| $u=\ \ 2.40458-1.69377I$<br>$a=\ \ 0.839800+0.202162I$<br>$b=\ \ 2.14114+0.18650I$ | $17.5291+4.7891I$ | $-13.20379-0.61326I$ |
| $u=-17.9093$<br>$a=-0.565105$<br>$b=-2.35407$ | $6.82503$ | $0$ |

**II.** $I^u_2 = \langle u^7+u^6-3u^5-2u^4+3u^3+b+2,\ u^7+u^6-3u^5-2u^4+3u^3+a+2,\ u^8+u^7-3u^6-2u^5+3u^4+2u-1\rangle$

**(i) Arc colorings**

$$a_4 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_9 = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_5 = \begin{pmatrix}1\\u^2\end{pmatrix}$$
$$a_{11} = \begin{pmatrix}-u^7-u^6+3u^5+2u^4-3u^3-2\\-u^7-u^6+3u^5+2u^4-3u^3-2\end{pmatrix}$$
$$a_{12} = \begin{pmatrix}-u^7-u^6+3u^5+2u^4-3u^3-2\\-u^7-u^6+3u^5+2u^4-3u^3-u-2\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}-u^7-u^6+3u^5+2u^4-3u^3-2\\-u^7-u^6+3u^5+2u^4-3u^3-2\end{pmatrix}$$
$$a_1 = \begin{pmatrix}0\\-u\end{pmatrix}$$
$$a_8 = \begin{pmatrix}u\\u\end{pmatrix}$$
$$a_7 = \begin{pmatrix}u\\u\end{pmatrix}$$
$$a_3 = \begin{pmatrix}-u^2+1\\-u^2\end{pmatrix}$$
$$a_6 = \begin{pmatrix}-u^3+2u\\-u^5+u^3+u\end{pmatrix}$$
$$a_2 = \begin{pmatrix}u^5-2u^3+u\\u^5-u^3-u\end{pmatrix}$$

**(ii) Obstruction class** $= 1$

**(iii) Cusp Shapes** $= 8u^7+8u^6-18u^5-12u^4+7u^3-3u^2+12u-3$

**(iv) u-Polynomials at the component**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^8 - 3u^7 + 7u^6 - 10u^5 + 11u^4 - 10u^3 + 6u^2 - 4u + 1$ |
| $c_2$ | $u^8 - u^7 - u^6 + 2u^5 + u^4 - 2u^3 + 2u - 1$ |
| $c_3, c_4$ | $u^8 + u^7 - 3u^6 - 2u^5 + 3u^4 + 2u - 1$ |
| $c_5$ | $u^8 + u^7 - u^6 - 2u^5 + u^4 + 2u^3 - 2u - 1$ |
| $c_6$ | $u^8 + 3u^7 + 7u^6 + 10u^5 + 11u^4 + 10u^3 + 6u^2 + 4u + 1$ |
| $c_7, c_{10}$ | $u^8$ |
| $c_8$ | $u^8 - u^7 - 3u^6 + 2u^5 + 3u^4 - 2u - 1$ |
| $c_9$ | $(u-1)^8$ |
| $c_{11}, c_{12}$ | $(u+1)^8$ |

**(v) Riley Polynomials at the component**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_6$ | $y^8 + 5y^7 + 11y^6 + 6y^5 - 17y^4 - 34y^3 - 22y^2 - 4y + 1$ |
| $c_2, c_5$ | $y^8 - 3y^7 + 7y^6 - 10y^5 + 11y^4 - 10y^3 + 6y^2 - 4y + 1$ |
| $c_3, c_4, c_8$ | $y^8 - 7y^7 + 19y^6 - 22y^5 + 3y^4 + 14y^3 - 6y^2 - 4y + 1$ |
| $c_7, c_{10}$ | $y^8$ |
| $c_9, c_{11}, c_{12}$ | $(y-1)^8$ |

**(vi) Complex Volumes and Cusp Shapes**

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.180120 + 0.268597I$<br>$a = -0.805639 + 0.183365I$<br>$b = -0.805639 + 0.183365I$ | $-2.68559 - 1.13123I$ | $-13.78185 + 1.82144I$ |
| $u = 1.180120 - 0.268597I$<br>$a = -0.805639 - 0.183365I$<br>$b = -0.805639 - 0.183365I$ | $-2.68559 + 1.13123I$ | $-13.78185 - 1.82144I$ |
| $u = 0.108090 + 0.747508I$<br>$a = -0.189481 + 1.310380I$<br>$b = -0.189481 + 1.310380I$ | $0.51448 - 2.57849I$ | $-9.42408 + 5.06085I$ |
| $u = 0.108090 - 0.747508I$<br>$a = -0.189481 - 1.310380I$<br>$b = -0.189481 - 1.310380I$ | $0.51448 + 2.57849I$ | $-9.42408 - 5.06085I$ |
| $u = -1.37100$<br>$a = 0.729394$<br>$b = 0.729394$ | $-8.14766$ | $-18.0480$ |
| $u = -1.334530 + 0.318930I$<br>$a = 0.708845 + 0.169402I$<br>$b = 0.708845 + 0.169402I$ | $-4.02461 + 6.44354I$ | $-15.1664 - 7.9255I$ |
| $u = -1.334530 - 0.318930I$<br>$a = 0.708845 - 0.169402I$<br>$b = 0.708845 - 0.169402I$ | $-4.02461 - 6.44354I$ | $-15.1664 + 7.9255I$ |
| $u = 0.463640$<br>$a = -2.15684$<br>$b = -2.15684$ | $-2.48997$ | $1.79260$ |

**III.**

$\boldsymbol{I_1^v = \langle a,\ 251v^5+1517v^4+\cdots+413b+768,\ v^6+6v^5+11v^4+24v^3+15v^2+3v+1\rangle}$

**(i) Arc colorings**

$$a_4 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} v \\ 0 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} 0 \\ -0.607748v^5 - 3.67312v^4 + \cdots - 9.28329v - 1.85956 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} 0.0290557v^5 + 0.0242131v^4 + \cdots - 0.687651v - 0.0266344 \\ -0.607748v^5 - 3.67312v^4 + \cdots - 9.28329v - 1.85956 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -0.0290557v^5 - 0.0242131v^4 + \cdots + 0.687651v + 0.0266344 \\ -0.392252v^5 - 2.32688v^4 + \cdots - 5.71671v - 1.14044 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} -v \\ -0.392252v^5 - 2.32688v^4 + \cdots - 5.71671v - 1.14044 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} v \\ 0 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} v \\ 0.392252v^5 + 2.32688v^4 + \cdots + 5.71671v + 1.14044 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 0.0266344v^5 + 0.188862v^4 + \cdots + 0.0363196v + 1.39225 \\ -0.421308v^5 - 2.35109v^4 + \cdots - 3.02906v + 0.886199 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} 0.392252v^5 + 2.32688v^4 + \cdots + 6.71671v + 1.14044 \\ 0.392252v^5 + 2.32688v^4 + \cdots + 5.71671v + 1.14044 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} 0.569007v^5 + 3.30751v^4 + \cdots + 6.86683v + 1.56174 \\ -0.0290557v^5 - 0.0242131v^4 + \cdots + 2.68765v + 1.02663 \end{pmatrix}$$

**(ii) Obstruction class** $= 1$

**(iii) Cusp Shapes** $= \frac{1191}{413}v^5 + \frac{6981}{413}v^4 + \frac{11931}{413}v^3 + \frac{26206}{413}v^2 + \frac{13113}{413}v - \frac{8216}{413}$

**(iv) u-Polynomials at the component**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_3$ | $(u^3 - u^2 + 2u - 1)^2$ |
| $c_2$ | $(u^3 + u^2 - 1)^2$ |
| $c_4, c_8$ | $u^6$ |
| $c_5$ | $(u^3 - u^2 + 1)^2$ |
| $c_6$ | $(u^3 + u^2 + 2u + 1)^2$ |
| $c_7, c_9$ | $(u^2 + u - 1)^3$ |
| $c_{10}, c_{11}, c_{12}$ | $(u^2 - u - 1)^3$ |

**(v) Riley Polynomials at the component**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_3, c_6$ | $(y^3 + 3y^2 + 2y - 1)^2$ |
| $c_2, c_5$ | $(y^3 - y^2 + 2y - 1)^2$ |
| $c_4, c_8$ | $y^6$ |
| $c_7, c_9, c_{10}$<br>$c_{11}, c_{12}$ | $(y^2 - 3y + 1)^3$ |

**(vi) Complex Volumes and Cusp Shapes**

| Solutions to $I_1^v$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $v=-0.670304$ <br> $a=0$ <br> $b=-0.922021$ | $-2.10041$ | $-18.3450$ |
| $v=-0.046814+0.284512I$ <br> $a=0$ <br> $b=-0.34801-2.11500I$ | $2.03717-2.82812I$ | $-25.9630+6.8067I$ |
| $v=-0.046814-0.284512I$ <br> $a=0$ <br> $b=-0.34801+2.11500I$ | $2.03717+2.82812I$ | $-25.9630-6.8067I$ |
| $v=-0.32087+1.95007I$ <br> $a=0$ <br> $b=0.132927+0.807858I$ | $-5.85852-2.82812I$ | $-18.4326+1.8100I$ |
| $v=-0.32087-1.95007I$ <br> $a=0$ <br> $b=0.132927-0.807858I$ | $-5.85852+2.82812I$ | $-18.4326-1.8100I$ |
| $v=-4.59433$ <br> $a=0$ <br> $b=0.352181$ | $-9.99610$ | $0.135730$ |

**IV. u-Polynomials**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $(u^3-u^2+2u-1)^2$<br>$\cdot(u^8-3u^7+7u^6-10u^5+11u^4-10u^3+6u^2-4u+1)$<br>$\cdot(u^{14}+9u^{13}+\cdots+16u+1)$ |
| $c_2$ | $(u^3+u^2-1)^2(u^8-u^7-u^6+2u^5+u^4-2u^3+2u-1)$<br>$\cdot(u^{14}+3u^{13}+\cdots+8u+1)$ |
| $c_3$ | $(u^3-u^2+2u-1)^2(u^8+u^7-3u^6-2u^5+3u^4+2u-1)$<br>$\cdot(u^{14}-61u^{13}+\cdots+58652u+7489)$ |
| $c_4$ | $u^6(u^8+u^7+\cdots+2u-1)(u^{14}+13u^{13}+\cdots-32u+64)$ |
| $c_5$ | $(u^3-u^2+1)^2(u^8+u^7-u^6-2u^5+u^4+2u^3-2u-1)$<br>$\cdot(u^{14}+3u^{13}+\cdots+8u+1)$ |
| $c_6$ | $(u^3+u^2+2u+1)^2$<br>$\cdot(u^8+3u^7+7u^6+10u^5+11u^4+10u^3+6u^2+4u+1)$<br>$\cdot(u^{14}+9u^{13}+\cdots+16u+1)$ |
| $c_7$ | $u^8(u^2+u-1)^3(u^{14}+41u^{13}+\cdots-640u+256)$ |
| $c_8$ | $u^6(u^8-u^7+\cdots-2u-1)(u^{14}+13u^{13}+\cdots-32u+64)$ |
| $c_9$ | $((u-1)^8)(u^2+u-1)^3(u^{14}-21u^{13}+\cdots+17u+1)$ |
| $c_{10}$ | $u^8(u^2-u-1)^3(u^{14}+41u^{13}+\cdots-640u+256)$ |
| $c_{11}, c_{12}$ | $((u+1)^8)(u^2-u-1)^3(u^{14}-21u^{13}+\cdots+17u+1)$ |

**V. Riley Polynomials**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_6$ | $(y^3+3y^2+2y-1)^2$ <br> $\cdot\,(y^8+5y^7+11y^6+6y^5-17y^4-34y^3-22y^2-4y+1)$ <br> $\cdot\,(y^{14}-13y^{13}+\cdots-32y+1)$ |
| $c_2, c_5$ | $(y^3-y^2+2y-1)^2$ <br> $\cdot\,(y^8-3y^7+7y^6-10y^5+11y^4-10y^3+6y^2-4y+1)$ <br> $\cdot\,(y^{14}-9y^{13}+\cdots-16y+1)$ |
| $c_3$ | $(y^3+3y^2+2y-1)^2$ <br> $\cdot\,(y^8-7y^7+19y^6-22y^5+3y^4+14y^3-6y^2-4y+1)$ <br> $\cdot\,(y^{14}-3381y^{13}+\cdots-1276544916y+56085121)$ |
| $c_4, c_8$ | $y^6(y^8-7y^7+19y^6-22y^5+3y^4+14y^3-6y^2-4y+1)$ <br> $\cdot\,(y^{14}-339y^{13}+\cdots-62464y+4096)$ |
| $c_7, c_{10}$ | $y^8(y^2-3y+1)^3(y^{14}-1029y^{13}+\cdots-2539520y+65536)$ |
| $c_9, c_{11}, c_{12}$ | $((y-1)^8)(y^2-3y+1)^3(y^{14}-121y^{13}+\cdots-57y+1)$ |