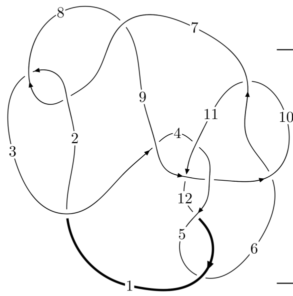
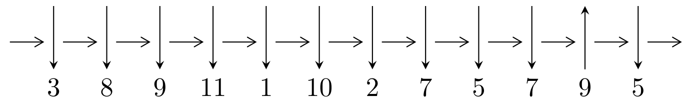
# $12n_{0638}$ ($K12n_{0638}$)




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$I_1^u = \langle -u^{14} - 3u^{13} + \cdots + 2b - 2,\ 7u^{14} + 29u^{13} + \cdots + 4a + 24,\ u^{15} + 5u^{14} + \cdots + 18u + 4 \rangle$$
$$I_2^u = \langle u^{10} + u^9 - u^8 + 4u^6 + 3u^5 - 2u^4 + 3u^2 + b + 2u,\ u^{10} + 3u^6 + u^5 + u^4 - u^3 + 2u^2 + a + 2u + 1,$$
$$u^{11} + u^{10} - u^9 - u^8 + 4u^7 + 4u^6 - 2u^5 - 3u^4 + 3u^3 + 4u^2 - 1 \rangle$$
$$I_3^u = \langle b + 2,\ a + 1,\ u - 1 \rangle$$
$$I_4^u = \langle a^3 + 2a^2 + 3b + a + 5,\ a^4 + a^3 + 2a^2 + 4a + 1,\ u - 1 \rangle$$

* 4 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 31 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. $I_1^u = \langle -u^{14}-3u^{13}+\cdots+2b-2,\ 7u^{14}+29u^{13}+\cdots+4a+24,\ u^{15}+5u^{14}+\cdots+18u+4\rangle$

**(i) Arc colorings**

$$a_2 = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_7 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_8 = \begin{pmatrix}1\\u^2\end{pmatrix}$$
$$a_3 = \begin{pmatrix}-u\\-u^3+u\end{pmatrix}$$
$$a_5 = \begin{pmatrix}-\frac{7}{4}u^{14}-\frac{29}{4}u^{13}+\cdots-\frac{105}{4}u-6\\ \frac{1}{2}u^{14}+\frac{3}{2}u^{13}+\cdots+\frac{11}{2}u+1\end{pmatrix}$$
$$a_9 = \begin{pmatrix}-u^2+1\\u^2\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}-\frac{1}{2}u^{14}-2u^{13}+\cdots-\frac{9}{2}u-\frac{1}{2}\\ \frac{1}{2}u^{14}+\frac{3}{2}u^{13}+\cdots+4u^2+\frac{1}{2}u\end{pmatrix}$$
$$a_{11} = \begin{pmatrix}-u^{14}-\frac{7}{2}u^{13}+\cdots-5u-\frac{1}{2}\\ \frac{1}{2}u^{14}+\frac{3}{2}u^{13}+\cdots+4u^2+\frac{1}{2}u\end{pmatrix}$$
$$a_1 = \begin{pmatrix}u^3\\u^5-u^3+u\end{pmatrix}$$
$$a_4 = \begin{pmatrix}u^7-2u^5+2u^3-2u\\-u^7+u^5-2u^3+u\end{pmatrix}$$
$$a_6 = \begin{pmatrix}\frac{5}{4}u^{14}+\frac{23}{4}u^{13}+\cdots+\frac{79}{4}u+6\\ -\frac{1}{2}u^{14}-\frac{3}{2}u^{13}+\cdots-\frac{9}{2}u-1\end{pmatrix}$$
$$a_{12} = \begin{pmatrix}-\frac{1}{2}u^{14}-2u^{13}+\cdots-\frac{9}{2}u-\frac{3}{2}\\ \frac{1}{2}u^{14}+\frac{3}{2}u^{13}+\cdots+3u^2+\frac{3}{2}u\end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -9u^{14}-39u^{13}-62u^{12}+12u^{11}+189u^{10}+271u^9+58u^8-259u^7-277u^6+33u^5+223u^4+70u^3-138u^2-142u-54$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_8$ | $u^{15} + 5u^{14} + \cdots + 108u + 16$ |
| $c_2, c_7$ | $u^{15} + 5u^{14} + \cdots + 18u + 4$ |
| $c_3$ | $u^{15} - 7u^{14} + \cdots - 7974u + 2196$ |
| $c_4, c_6, c_{10}$ | $u^{15} - 3u^{14} + \cdots + 2u + 1$ |
| $c_5, c_9, c_{12}$ | $u^{15} + 2u^{14} + \cdots - 3u - 1$ |
| $c_{11}$ | $u^{15} + 8u^{14} + \cdots + 26u + 2$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_8$ | $y^{15} + 11y^{14} + \cdots + 4464y - 256$ |
| $c_2, c_7$ | $y^{15} - 5y^{14} + \cdots + 108y - 16$ |
| $c_3$ | $y^{15} - 89y^{14} + \cdots + 102923820y - 4822416$ |
| $c_4, c_6, c_{10}$ | $y^{15} - 41y^{14} + \cdots + 36y - 1$ |
| $c_5, c_9, c_{12}$ | $y^{15} - 28y^{14} + \cdots - 11y - 1$ |
| $c_{11}$ | $y^{15} - 38y^{14} + \cdots + 200y - 4$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.606388 + 0.721644I$<br>$a = 1.39179 + 0.62558I$<br>$b = -0.960938 - 0.688802I$ | $-0.178243 - 0.909766I$ | $-10.00645 + 2.94587I$ |
| $u = -0.606388 - 0.721644I$<br>$a = 1.39179 - 0.62558I$<br>$b = -0.960938 + 0.688802I$ | $-0.178243 + 0.909766I$ | $-10.00645 - 2.94587I$ |
| $u = 1.08047$<br>$a = -0.675053$<br>$b = -1.51745$ | $-5.54081$ | $-14.3560$ |
| $u = 0.746431 + 0.514902I$<br>$a = 0.082980 - 0.242831I$<br>$b = 0.397865 - 0.145660I$ | $1.19505 - 1.99555I$ | $-7.66777 + 5.97030I$ |
| $u = 0.746431 - 0.514902I$<br>$a = 0.082980 + 0.242831I$<br>$b = 0.397865 + 0.145660I$ | $1.19505 + 1.99555I$ | $-7.66777 - 5.97030I$ |
| $u = -1.021710 + 0.661454I$<br>$a = -0.06650 - 1.96813I$<br>$b = -1.33073 + 0.86334I$ | $-1.39940 + 6.23344I$ | $-10.94430 - 8.75401I$ |
| $u = -1.021710 - 0.661454I$<br>$a = -0.06650 + 1.96813I$<br>$b = -1.33073 - 0.86334I$ | $-1.39940 - 6.23344I$ | $-10.94430 + 8.75401I$ |
| $u = -0.518806 + 1.107840I$<br>$a = -1.210170 - 0.046109I$<br>$b = 1.78546 + 0.11853I$ | $-10.31580 - 3.71425I$ | $-10.43409 + 0.73580I$ |
| $u = -0.518806 - 1.107840I$<br>$a = -1.210170 + 0.046109I$<br>$b = 1.78546 - 0.11853I$ | $-10.31580 + 3.71425I$ | $-10.43409 - 0.73580I$ |
| $u = -0.931933 + 0.895825I$<br>$a = -0.466639 + 0.398594I$<br>$b = 0.712541 + 0.015963I$ | $9.82516 + 3.30608I$ | $-14.5483 - 3.5573I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.931933 - 0.895825I$<br>$a = -0.466639 - 0.398594I$<br>$b = 0.712541 - 0.015963I$ | $9.82516 - 3.30608I$ | $-14.5483 + 3.5573I$ |
| $u = -1.21080 + 0.76031I$<br>$a = -0.31276 + 1.60256I$<br>$b = 1.83309 - 0.17932I$ | $-12.5061 + 10.4262I$ | $-11.73103 - 4.47783I$ |
| $u = -1.21080 - 0.76031I$<br>$a = -0.31276 - 1.60256I$<br>$b = 1.83309 + 0.17932I$ | $-12.5061 - 10.4262I$ | $-11.73103 + 4.47783I$ |
| $u = 1.46326$<br>$a = 0.512604$<br>$b = 1.84763$ | $-18.0985$ | $-13.9500$ |
| $u = -0.457334$<br>$a = 0.825053$<br>$b = -0.204761$ | $-0.594889$ | $-17.0300$ |

**II.** $\boldsymbol{I^u_2 = \langle u^{10} + u^9 - u^8 + 4u^6 + 3u^5 - 2u^4 + 3u^2 + b + 2u,\ u^{10} + 3u^6 + u^5 + u^4 - u^3 + 2u^2 + a + 2u + 1,\ u^{11} + u^{10} + \cdots + 4u^2 - 1\rangle}$

**(i) Arc colorings**

$$a_2 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$

$$a_7 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$

$$a_5 = \begin{pmatrix} -u^{10} - 3u^6 - u^5 - u^4 + u^3 - 2u^2 - 2u - 1 \\ -u^{10} - u^9 + u^8 - 4u^6 - 3u^5 + 2u^4 - 3u^2 - 2u \end{pmatrix}$$

$$a_9 = \begin{pmatrix} -u^2 + 1 \\ u^2 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -u^{10} + 2u^8 - 5u^6 + 6u^4 - 6u^2 - u + 4 \\ u^{10} + u^9 - u^8 - u^7 + 4u^6 + 3u^5 - 2u^4 - 2u^3 + 3u^2 + 2u \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} -2u^{10} - u^9 + 3u^8 + u^7 - 9u^6 - 3u^5 + 8u^4 + 2u^3 - 9u^2 - 3u + 4 \\ u^{10} + u^9 - u^8 - u^7 + 4u^6 + 3u^5 - 2u^4 - 2u^3 + 3u^2 + 2u \end{pmatrix}$$

$$a_1 = \begin{pmatrix} u^3 \\ u^5 - u^3 + u \end{pmatrix}$$

$$a_4 = \begin{pmatrix} u^7 - 2u^5 + 2u^3 - 2u \\ -u^7 + u^5 - 2u^3 + u \end{pmatrix}$$

$$a_6 = \begin{pmatrix} -2u^{10} - u^9 + u^8 - 7u^6 - 3u^5 + u^4 + u^3 - 5u^2 - 3u \\ -u^{10} - u^9 + u^8 + u^7 - 4u^6 - 4u^5 + 2u^4 + 2u^3 - 3u^2 - 3u \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} -u^{10} + 2u^8 - 5u^6 + 6u^4 + u^3 - 5u^2 - u + 3 \\ u^{10} + u^9 - u^8 - u^7 + 4u^6 + 4u^5 - 2u^4 - 3u^3 + 2u^2 + 3u \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= 2u^{10} + 2u^7 + 8u^6 - 2u^5 + u^3 + 10u^2 + u - 10$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{11} - 3u^{10} + \cdots + 8u - 1$ |
| $c_2$ | $u^{11} - u^{10} - u^9 + u^8 + 4u^7 - 4u^6 - 2u^5 + 3u^4 + 3u^3 - 4u^2 + 1$ |
| $c_3$ | $u^{11} - u^{10} + 7u^9 + u^8 - 2u^7 + 5u^6 + 39u^5 - 31u^4 + 12u^3 - u^2 - 2u + 1$ |
| $c_4, c_{10}$ | $u^{11} + 2u^{10} + 2u^9 + 2u^8 - u^7 - 3u^6 - u^5 + 2u^3 + 3u^2 + u + 1$ |
| $c_5, c_9$ | $u^{11} + u^{10} + 3u^9 + 2u^8 - u^6 - 3u^5 - u^4 + 2u^3 + 2u^2 + 2u + 1$ |
| $c_6$ | $u^{11} - 2u^{10} + 2u^9 - 2u^8 - u^7 + 3u^6 - u^5 + 2u^3 - 3u^2 + u - 1$ |
| $c_7$ | $u^{11} + u^{10} - u^9 - u^8 + 4u^7 + 4u^6 - 2u^5 - 3u^4 + 3u^3 + 4u^2 - 1$ |
| $c_8$ | $u^{11} + 3u^{10} + \cdots + 8u + 1$ |
| $c_{11}$ | $u^{11} - 11u^{10} + \cdots - 24u + 9$ |
| $c_{12}$ | $u^{11} - u^{10} + 3u^9 - 2u^8 + u^6 - 3u^5 + u^4 + 2u^3 - 2u^2 + 2u - 1$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_8$ | $y^{11} + 13y^{10} + \cdots + 20y - 1$ |
| $c_2, c_7$ | $y^{11} - 3y^{10} + \cdots + 8y - 1$ |
| $c_3$ | $y^{11} + 13y^{10} + \cdots + 6y - 1$ |
| $c_4, c_6, c_{10}$ | $y^{11} - 6y^9 + 2y^8 + 13y^7 - 9y^6 - 15y^5 + 8y^4 + 8y^3 - 5y^2 - 5y - 1$ |
| $c_5, c_9, c_{12}$ | $y^{11} + 5y^{10} + 5y^9 - 8y^8 - 8y^7 + 15y^6 + 9y^5 - 13y^4 - 2y^3 + 6y^2 - 1$ |
| $c_{11}$ | $y^{11} - 23y^{10} + \cdots - 324y - 81$ |

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

| Solutions to $I_2^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.859595 + 0.621070I$<br>$a = 0.264591 - 0.511619I$<br>$b = 1.184910 - 0.173635I$ | $5.06364 - 2.43633I$ | $-9.98510 + 2.91167I$ |
| $u = 0.859595 - 0.621070I$<br>$a = 0.264591 + 0.511619I$<br>$b = 1.184910 + 0.173635I$ | $5.06364 + 2.43633I$ | $-9.98510 - 2.91167I$ |
| $u = -0.715758 + 0.795244I$<br>$a = 1.83523 - 0.23082I$<br>$b = -1.61321 - 0.43685I$ | $-1.149260 + 0.247570I$ | $-13.50982 - 0.73342I$ |
| $u = -0.715758 - 0.795244I$<br>$a = 1.83523 + 0.23082I$<br>$b = -1.61321 + 0.43685I$ | $-1.149260 - 0.247570I$ | $-13.50982 + 0.73342I$ |
| $u = -0.791184 + 0.262463I$<br>$a = -0.50598 + 1.77609I$<br>$b = 0.389923 - 0.338442I$ | $3.12519 + 1.08690I$ | $-6.47529 - 6.28285I$ |
| $u = -0.791184 - 0.262463I$<br>$a = -0.50598 - 1.77609I$<br>$b = 0.389923 + 0.338442I$ | $3.12519 - 1.08690I$ | $-6.47529 + 6.28285I$ |
| $u = -1.006190 + 0.705559I$<br>$a = 0.60734 - 2.06814I$<br>$b = -1.77582 + 0.58284I$ | $-2.06494 + 5.42980I$ | $-15.7370 - 3.3620I$ |
| $u = -1.006190 - 0.705559I$<br>$a = 0.60734 + 2.06814I$<br>$b = -1.77582 - 0.58284I$ | $-2.06494 - 5.42980I$ | $-15.7370 + 3.3620I$ |
| $u = 0.925242 + 0.874685I$<br>$a = -0.038280 + 0.149800I$<br>$b = -0.412394 + 0.056790I$ | $10.30640 - 3.24156I$ | $2.36799 + 1.55443I$ |
| $u = 0.925242 - 0.874685I$<br>$a = -0.038280 - 0.149800I$<br>$b = -0.412394 - 0.056790I$ | $10.30640 + 3.24156I$ | $2.36799 - 1.55443I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = \quad 0.456590$<br>$a = -2.32582$<br>$b = -1.54682$ | $-4.24309$ | $-7.32160$ |

## III. $I_3^u = \langle b+2,\ a+1,\ u-1\rangle$

**(i) Arc colorings**

$$a_2 = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -1 \\ 0 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} -1 \\ -2 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} -1 \\ -1 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} 0 \\ -1 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} -1 \\ -1 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 0 \\ -1 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} 0 \\ -1 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -24$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_4, c_5$<br>$c_7, c_9, c_{10}$ | $u - 1$ |
| $c_2, c_3, c_6$<br>$c_8, c_{12}$ | $u + 1$ |
| $c_{11}$ | $u$ |

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

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

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

| Solutions to $I_3^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = \phantom{-}1.00000$<br>$a = -1.00000$<br>$b = -2.00000$ | $-6.57974$ | $-24.0000$ |

**IV.** $\boldsymbol{I_4^u = \langle a^3 + 2a^2 + 3b + a + 5,\ a^4 + a^3 + 2a^2 + 4a + 1,\ u - 1\rangle}$

**(i) Arc colorings**

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

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

**(iii) Cusp Shapes** $= -14$

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

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

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

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

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

| Solutions to $I_4^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.00000$<br>$a = -1.33107$<br>$b = -1.61803$ | $-5.59278$ | $-14.0000$ |
| $u = 1.00000$<br>$a = 0.30902 + 1.58825I$<br>$b = 0.618034$ | $2.30291$ | $-14.0000$ |
| $u = 1.00000$<br>$a = 0.30902 - 1.58825I$<br>$b = 0.618034$ | $2.30291$ | $-14.0000$ |
| $u = 1.00000$<br>$a = -0.286961$<br>$b = -1.61803$ | $-5.59278$ | $-14.0000$ |

**V. u-Polynomials**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $(u-1)(u+1)^4(u^{11}-3u^{10}+\cdots+8u-1)(u^{15}+5u^{14}+\cdots+108u+16)$ |
| $c_2$ | $(u-1)^4(u+1)$<br>$\cdot(u^{11}-u^{10}-u^9+u^8+4u^7-4u^6-2u^5+3u^4+3u^3-4u^2+1)$<br>$\cdot(u^{15}+5u^{14}+\cdots+18u+4)$ |
| $c_3$ | $(u-1)^4(u+1)$<br>$\cdot(u^{11}-u^{10}+7u^9+u^8-2u^7+5u^6+39u^5-31u^4+12u^3-u^2-2u+1)$<br>$\cdot(u^{15}-7u^{14}+\cdots-7974u+2196)$ |
| $c_4, c_{10}$ | $(u-1)(u^4+u^3-2u-1)$<br>$\cdot(u^{11}+2u^{10}+2u^9+2u^8-u^7-3u^6-u^5+2u^3+3u^2+u+1)$<br>$\cdot(u^{15}-3u^{14}+\cdots+2u+1)$ |
| $c_5, c_9$ | $(u-1)(u^4-u^3+2u^2-4u+1)$<br>$\cdot(u^{11}+u^{10}+3u^9+2u^8-u^6-3u^5-u^4+2u^3+2u^2+2u+1)$<br>$\cdot(u^{15}+2u^{14}+\cdots-3u-1)$ |
| $c_6$ | $(u+1)(u^4+u^3-2u-1)$<br>$\cdot(u^{11}-2u^{10}+2u^9-2u^8-u^7+3u^6-u^5+2u^3-3u^2+u-1)$<br>$\cdot(u^{15}-3u^{14}+\cdots+2u+1)$ |
| $c_7$ | $(u-1)^5(u^{11}+u^{10}-u^9-u^8+4u^7+4u^6-2u^5-3u^4+3u^3+4u^2-1)$<br>$\cdot(u^{15}+5u^{14}+\cdots+18u+4)$ |
| $c_8$ | $((u+1)^5)(u^{11}+3u^{10}+\cdots+8u+1)(u^{15}+5u^{14}+\cdots+108u+16)$ |
| $c_{11}$ | $u(u^2-u-1)^2(u^{11}-11u^{10}+\cdots-24u+9)$<br>$\cdot(u^{15}+8u^{14}+\cdots+26u+2)$ |
| $c_{12}$ | $(u+1)(u^4-u^3+2u^2-4u+1)$<br>$\cdot(u^{11}-u^{10}+3u^9-2u^8+u^6-3u^5+u^4+2u^3-2u^2+2u-1)$<br>$\cdot(u^{15}+2u^{14}+\cdots-3u-1)$ |

## VI. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_8$ | $((y-1)^5)(y^{11}+13y^{10}+\cdots+20y-1)$ <br> $\cdot(y^{15}+11y^{14}+\cdots+4464y-256)$ |
| $c_2, c_7$ | $((y-1)^5)(y^{11}-3y^{10}+\cdots+8y-1)(y^{15}-5y^{14}+\cdots+108y-16)$ |
| $c_3$ | $((y-1)^5)(y^{11}+13y^{10}+\cdots+6y-1)$ <br> $\cdot(y^{15}-89y^{14}+\cdots+102923820y-4822416)$ |
| $c_4, c_6, c_{10}$ | $(y-1)(y^4-y^3+2y^2-4y+1)$ <br> $\cdot(y^{11}-6y^9+2y^8+13y^7-9y^6-15y^5+8y^4+8y^3-5y^2-5y-1)$ <br> $\cdot(y^{15}-41y^{14}+\cdots+36y-1)$ |
| $c_5, c_9, c_{12}$ | $(y-1)(y^4+3y^3-2y^2-12y+1)$ <br> $\cdot(y^{11}+5y^{10}+5y^9-8y^8-8y^7+15y^6+9y^5-13y^4-2y^3+6y^2-1)$ <br> $\cdot(y^{15}-28y^{14}+\cdots-11y-1)$ |
| $c_{11}$ | $y(y^2-3y+1)^2(y^{11}-23y^{10}+\cdots-324y-81)$ <br> $\cdot(y^{15}-38y^{14}+\cdots+200y-4)$ |