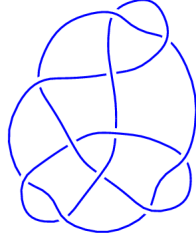
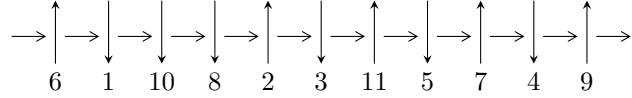


11a<sub>99</sub> (K11a<sub>99</sub>)

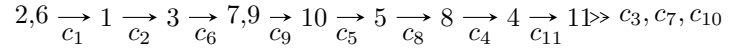


1

**Arc Sequences**



**Solving Sequence**



**Representation Ideals**

$$I = \bigcap_{i=1}^4 I_i^u$$

$$I_1^u = \langle a^{12} + 3a^{11} - 3a^{10} - 17a^9 - 6a^8 + 9a^7 + 14a^6 + 18a^5 + 24a^4 + 53a^3 + 39a^2 + 3a + 1, \\ -137a^{11} + 603b + \dots - 3513a - 541, 142a^{11} + 1809u + \dots + 13388a - 9 \rangle$$

$$I_2^u = \langle a^{40} + 4a^{39} + \dots + 5065101a + 759841, \\ 6.88116 \times 10^{179}u - 9.38038 \times 10^{174}a^{39} + \dots - 6.48720 \times 10^{181}a - 1.27844 \times 10^{181}, \\ 8.96260 \times 10^{187}b + 2.34863 \times 10^{183}a^{39} + \dots + 1.66943 \times 10^{190}a + 3.27943 \times 10^{189} \rangle$$

$$I_3^u = \langle u^{13} - u^{12} + 4u^{11} - 3u^{10} + 7u^9 - 4u^8 + 5u^7 - u^6 + 2u^4 - 2u^3 + 3u^2 - u + 1, \\ u^{11} - u^{10} + 4u^9 - 3u^8 + 7u^7 - 4u^6 + 4u^5 - u^3 + 3u^2 + b - 2u + 3, \\ -2u^{12} + u^{11} - 6u^{10} + u^9 - 8u^8 - u^7 - 2u^6 - 4u^5 + u^4 - 2u^3 + a - 2u - 2 \rangle$$

$$I_4^u = \langle u^{28} + 6u^{27} + \dots + 26u + 4, -3u^{27} - 26u^{26} + \dots + 2b - 6, 9u^{27} + 72u^{26} + \dots + 4a + 84 \rangle$$

There are 4 irreducible components with 93 representations.

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<sup>1</sup>The knot diagram image is adapter from “C. Livingston and A. H. Moore, KnotInfo: Table of Knot Invariants, <http://www.indiana.edu/~knotinfo>”

$$\text{I. } I_1^u = \langle a^{12} + 3a^{11} + \dots + 3a + 1, -137a^{11} + 603b + \dots - 3513a - 541, 142a^{11} + 1809u + \dots + 13388a - 9 \rangle$$

(i) Arc colorings

$$\begin{aligned} a_2 &= \begin{pmatrix} 1 \\ 0 \end{pmatrix} \\ a_6 &= \begin{pmatrix} 0 \\ -0.0784964a^{11} - 0.358762a^{10} + \dots - 7.40077a + 0.00497512 \end{pmatrix} \\ a_1 &= \begin{pmatrix} 1 \\ -0.0547264a^{11} - 0.249862a^{10} + \dots - 5.04754a - 1.46158 \end{pmatrix} \\ a_3 &= \begin{pmatrix} -0.0547264a^{11} - 0.249862a^{10} + \dots - 5.04754a - 0.461581 \\ 0.133223a^{11} + 0.608624a^{10} + \dots + 12.4483a + 1.45661 \end{pmatrix} \\ a_7 &= \begin{pmatrix} -0.0547264a^{11} - 0.249862a^{10} + \dots - 5.04754a - 0.461581 \\ 0.0547264a^{11} + 0.249862a^{10} + \dots + 5.04754a + 1.46158 \end{pmatrix} \\ a_9 &= \begin{pmatrix} a \\ 0.227197a^{11} + 0.611940a^{10} + \dots + 5.82587a + 0.897181 \end{pmatrix} \\ a_{10} &= \begin{pmatrix} 0.0298507a^{11} + 0.00497512a^{10} + \dots - 1.37811a - 0.839138 \\ -0.0110558a^{11} + 0.0845771a^{10} + \dots + 2.94251a + 2.10503 \end{pmatrix} \\ a_5 &= \begin{pmatrix} 0.0784964a^{11} + 0.358762a^{10} + \dots + 7.40077a - 0.00497512 \\ -0.0784964a^{11} - 0.358762a^{10} + \dots - 7.40077a + 0.00497512 \end{pmatrix} \\ a_8 &= \begin{pmatrix} -0.435600a^{11} - 1.13433a^{10} + \dots - 10.0873a - 0.528469 \\ 0.662797a^{11} + 1.74627a^{10} + \dots + 16.9132a + 1.42565 \end{pmatrix} \\ a_4 &= \begin{pmatrix} -0.0243228a^{11} - 0.213930a^{10} + \dots - 5.59315a - 0.546711 \\ 0.138198a^{11} + 0.665008a^{10} + \dots + 13.9409a + 1.79823 \end{pmatrix} \\ a_{11} &= \begin{pmatrix} -0.158098a^{11} - 0.297955a^{10} + \dots - 0.0961857a + 0.687120 \\ 0.0884467a^{11} + 0.175235a^{10} + \dots + 0.311774a - 1.91432 \end{pmatrix} \\ a_{11} &= \begin{pmatrix} -0.158098a^{11} - 0.297955a^{10} + \dots - 0.0961857a + 0.687120 \\ 0.0884467a^{11} + 0.175235a^{10} + \dots + 0.311774a - 1.91432 \end{pmatrix} \end{aligned}$$

(ii) Obstruction class = -1

(iii) Cusp Shapes = unknown

(iv) Complex Volumes and Cusp Shapes

Solution to $I_1^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.682328$		
$a = -2.33446 - 0.93114I$	$-6.57974 - 2.02988I$	$-8.00000 + 3.46410I$
$b = 0.500000 + 0.866025I$		
$u = -0.682328$		
$a = -2.33446 + 0.93114I$	$-6.57974 + 2.02988I$	$-8.00000 - 3.46410I$
$b = 0.500000 - 0.866025I$		
$u = 0.341164 - 1.161541I$		
$a = -1.034830 - 0.098333I$	$-6.57974 + 2.02988I$	$-8.00000 - 3.46410I$
$b = 0.500000 - 0.866025I$		
$u = 0.341164 + 1.161541I$		
$a = -1.034830 + 0.098333I$	$-6.57974 - 2.02988I$	$-8.00000 + 3.46410I$
$b = 0.500000 + 0.866025I$		
$u = 0.341164 - 1.161541I$		
$a = -0.478220 - 1.030978I$	$-6.57974 - 2.02988I$	$-8.00000 + 3.46410I$
$b = 0.500000 + 0.866025I$		
$u = 0.341164 + 1.161541I$		
$a = -0.478220 + 1.030978I$	$-6.57974 + 2.02988I$	$-8.00000 - 3.46410I$
$b = 0.500000 - 0.866025I$		
$u = 0.341164 + 1.161541I$		
$a = -0.021780 - 0.164953I$	$-6.57974 + 2.02988I$	$-8.00000 - 3.46410I$
$b = 0.500000 - 0.866025I$		
$u = 0.341164 - 1.161541I$		
$a = -0.021780 + 0.164953I$	$-6.57974 - 2.02988I$	$-8.00000 + 3.46410I$
$b = 0.500000 + 0.866025I$		
$u = 0.341164 + 1.161541I$		
$a = 0.534830 - 0.964359I$	$-6.57974 - 2.02988I$	$-8.00000 + 3.46410I$
$b = 0.500000 + 0.866025I$		
$u = 0.341164 - 1.161541I$		
$a = 0.534830 + 0.964359I$	$-6.57974 + 2.02988I$	$-8.00000 - 3.46410I$
$b = 0.500000 - 0.866025I$		

Solution to $I_1^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.682328$		
$a = 1.83446 - 0.06511I$	$-6.57974 + 2.02988I$	$-8.00000 - 3.46410I$
$b = 0.500000 - 0.866025I$		
$u = -0.682328$		
$a = 1.83446 + 0.06511I$	$-6.57974 - 2.02988I$	$-8.00000 + 3.46410I$
$b = 0.500000 + 0.866025I$		

$$\text{II. } I_2^u = \langle a^{40} + 4a^{39} + \dots + 5065101a + 759841, 6.88 \times 10^{179}u - 9.38 \times 10^{174}a^{39} + \dots - 6.49 \times 10^{181}a - 1.28 \times 10^{181}, 8.96 \times 10^{187}b + 2.35 \times 10^{183}a^{39} + \dots + 1.67 \times 10^{190}a + 3.28 \times 10^{189} \rangle$$

(i) Arc colorings

$$\begin{aligned} a_2 &= \begin{pmatrix} 1 \\ 0 \end{pmatrix} \\ a_6 &= \begin{pmatrix} 0 \\ 0.0000136320a^{39} + 0.0000482406a^{38} + \dots + 94.2749a + 18.5789 \end{pmatrix} \\ a_1 &= \begin{pmatrix} 1 \\ 0.0000143304a^{39} + 0.0000482792a^{38} + \dots + 82.6804a + 14.3165 \end{pmatrix} \\ a_3 &= \begin{pmatrix} 0.0000143304a^{39} + 0.0000482792a^{38} + \dots + 82.6804a + 15.3165 \\ -4.19309 \times 10^{-6}a^{39} - 0.0000144340a^{38} + \dots - 30.9910a - 6.23645 \end{pmatrix} \\ a_7 &= \begin{pmatrix} -0.0000189345a^{39} - 0.0000644361a^{38} + \dots - 107.893a - 18.4001 \\ 0.0000120128a^{39} + 0.0000408703a^{38} + \dots + 74.7415a + 14.2643 \end{pmatrix} \\ a_9 &= \begin{pmatrix} a \\ -0.0000262048a^{39} - 0.0000932248a^{38} + \dots - 186.266a - 36.5902 \end{pmatrix} \\ a_{10} &= \begin{pmatrix} 0.0000128705a^{39} + 0.0000392978a^{38} + \dots + 62.5952a + 11.9291 \\ -0.0000293630a^{39} - 0.000102767a^{38} + \dots - 196.270a - 38.0389 \end{pmatrix} \\ a_5 &= \begin{pmatrix} -0.0000136320a^{39} - 0.0000482406a^{38} + \dots - 94.2749a - 18.5789 \\ 0.0000136320a^{39} + 0.0000482406a^{38} + \dots + 94.2749a + 18.5789 \end{pmatrix} \\ a_8 &= \begin{pmatrix} 7.88009 \times 10^{-6}a^{39} + 0.0000294740a^{38} + \dots + 70.6898a + 15.5188 \\ -0.0000340849a^{39} - 0.000122699a^{38} + \dots - 255.956a - 52.1090 \end{pmatrix} \\ a_4 &= \begin{pmatrix} -1.42368 \times 10^{-6}a^{39} + 1.42214 \times 10^{-6}a^{38} + \dots + 28.8567a + 8.01645 \\ -0.0000330378a^{39} - 0.000121020a^{38} + \dots - 264.298a - 55.1585 \end{pmatrix} \\ a_{11} &= \begin{pmatrix} 6.69353 \times 10^{-6}a^{39} + 0.0000258980a^{38} + \dots + 61.2288a + 14.0408 \\ 2.72368 \times 10^{-6}a^{39} - 7.78605 \times 10^{-7}a^{38} + \dots - 66.7302a - 22.0500 \end{pmatrix} \\ a_{11} &= \begin{pmatrix} 6.69353 \times 10^{-6}a^{39} + 0.0000258980a^{38} + \dots + 61.2288a + 14.0408 \\ 2.72368 \times 10^{-6}a^{39} - 7.78605 \times 10^{-7}a^{38} + \dots - 66.7302a - 22.0500 \end{pmatrix} \end{aligned}$$

(ii) Obstruction class = -1

(iii) Cusp Shapes = unknown

(iv) Complex Volumes and Cusp Shapes

Solution to $I_2^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.248527 + 0.782547I$ $a = -2.16490 - 1.33388I$ $b = 2.78977 + 0.25266I$	$-5.38286 - 0.79819I$	$-6.90177 - 1.98497I$
$u = 0.248527 - 0.782547I$ $a = -2.16490 + 1.33388I$ $b = 2.78977 - 0.25266I$	$-5.38286 + 0.79819I$	$-6.90177 + 1.98497I$
$u = -0.449566 + 1.164785I$ $a = -1.75450 - 1.78926I$ $b = 2.08774 + 2.71705I$	$-9.81146 - 2.11597I$	$-10.98134 + 0.51190I$
$u = -0.449566 - 1.164785I$ $a = -1.75450 + 1.78926I$ $b = 2.08774 - 2.71705I$	$-9.81146 + 2.11597I$	$-10.98134 - 0.51190I$
$u = -0.584958 + 0.771492I$ $a = -1.63324 - 0.44978I$ $b = 0.783367 + 0.997354I$	$0.00239 - 4.33994I$	$-1.13631 + 6.98543I$
$u = -0.584958 - 0.771492I$ $a = -1.63324 + 0.44978I$ $b = 0.783367 - 0.997354I$	$0.00239 + 4.33994I$	$-1.13631 - 6.98543I$
$u = 0.524355 - 1.163405I$ $a = -1.43496 - 0.55642I$ $b = 1.51204 + 1.58158I$	$-5.31595 - 6.25643I$	$-6.17560 + 2.68471I$
$u = 0.524355 + 1.163405I$ $a = -1.43496 + 0.55642I$ $b = 1.51204 - 1.58158I$	$-5.31595 + 6.25643I$	$-6.17560 - 2.68471I$
$u = 0.524355 - 1.163405I$ $a = -1.20657 - 1.25082I$ $b = 0.33739 + 1.88156I$	$-5.31595 - 10.31620I$	$-6.17560 + 9.61291I$
$u = 0.524355 + 1.163405I$ $a = -1.20657 + 1.25082I$ $b = 0.33739 - 1.88156I$	$-5.31595 + 10.31620I$	$-6.17560 - 9.61291I$

Solution to $I_2^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.761643 - 0.208049I$ $a = -1.109163 - 0.691872I$ $b = -0.405801 + 0.684900I$	$-2.52120 + 1.44851I$	$-2.80497 + 0.66896I$
$u = 0.761643 + 0.208049I$ $a = -1.109163 + 0.691872I$ $b = -0.405801 - 0.684900I$	$-2.52120 - 1.44851I$	$-2.80497 - 0.66896I$
$u = 0.761643 + 0.208049I$ $a = -0.888121 - 0.198095I$ $b = 0.169145 - 1.209713I$	$-2.52120 - 5.50828I$	$-2.80497 + 6.25925I$
$u = 0.761643 - 0.208049I$ $a = -0.888121 + 0.198095I$ $b = 0.169145 + 1.209713I$	$-2.52120 + 5.50828I$	$-2.80497 - 6.25925I$
$u = -0.584958 + 0.771492I$ $a = -0.811252 - 0.684607I$ $b = 0.326566 + 1.346246I$	$0.002387 - 0.280172I$	$-1.136314 + 0.057227I$
$u = -0.584958 - 0.771492I$ $a = -0.811252 + 0.684607I$ $b = 0.326566 - 1.346246I$	$0.002387 + 0.280172I$	$-1.136314 - 0.057227I$
$u = 0.248527 - 0.782547I$ $a = -0.77879 - 1.65055I$ $b = -0.1103874 + 0.0163537I$	$-5.38286 + 0.79819I$	$-6.90177 + 1.98497I$
$u = 0.248527 + 0.782547I$ $a = -0.77879 + 1.65055I$ $b = -0.1103874 - 0.0163537I$	$-5.38286 - 0.79819I$	$-6.90177 - 1.98497I$
$u = 0.248527 - 0.782547I$ $a = -0.528657 - 0.220233I$ $b = 0.80276 + 1.85708I$	$-5.38286 - 3.26157I$	$-6.90177 + 8.91318I$
$u = 0.248527 + 0.782547I$ $a = -0.528657 + 0.220233I$ $b = 0.80276 - 1.85708I$	$-5.38286 + 3.26157I$	$-6.90177 - 8.91318I$

Solution to $I_2^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.761643 + 0.208049I$ $a = -0.465789 - 0.420142I$ $b = 0.307020 + 0.341147I$	$-2.52120 - 1.44851I$	$-2.80497 - 0.66896I$
$u = 0.761643 - 0.208049I$ $a = -0.465789 + 0.420142I$ $b = 0.307020 - 0.341147I$	$-2.52120 + 1.44851I$	$-2.80497 + 0.66896I$
$u = -0.584958 - 0.771492I$ $a = -0.13825 - 1.48131I$ $b = 0.856552 + 0.765235I$	$0.002387 + 0.280172I$	$-1.136314 - 0.057227I$
$u = -0.584958 + 0.771492I$ $a = -0.13825 + 1.48131I$ $b = 0.856552 - 0.765235I$	$0.002387 - 0.280172I$	$-1.136314 + 0.057227I$
$u = -0.449566 + 1.164785I$ $a = 0.152868 - 0.428323I$ $b = -1.107139 - 0.677603I$	$-9.81146 - 2.11597I$	$-10.98134 + 0.51190I$
$u = -0.449566 - 1.164785I$ $a = 0.152868 + 0.428323I$ $b = -1.107139 + 0.677603I$	$-9.81146 + 2.11597I$	$-10.98134 - 0.51190I$
$u = 0.524355 - 1.163405I$ $a = 0.740427 - 0.151085I$ $b = -0.650836 + 0.191721I$	$-5.31595 - 6.25643I$	$-6.17560 + 2.68471I$
$u = 0.524355 + 1.163405I$ $a = 0.740427 + 0.151085I$ $b = -0.650836 - 0.191721I$	$-5.31595 + 6.25643I$	$-6.17560 - 2.68471I$
$u = -0.449566 + 1.164785I$ $a = 0.79423 - 1.18245I$ $b = -0.42710 + 2.17011I$	$-9.81146 - 6.17573I$	$-10.98134 + 7.44010I$
$u = -0.449566 - 1.164785I$ $a = 0.79423 + 1.18245I$ $b = -0.42710 - 2.17011I$	$-9.81146 + 6.17573I$	$-10.98134 - 7.44010I$



Solution to $I_2^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.584958 + 0.771492I$ $a = 1.41803 - 0.77086I$ $b = -1.87810 - 0.26325I$	$0.00239 - 4.33994I$	$-1.13631 + 6.98543I$
$u = -0.584958 - 0.771492I$ $a = 1.41803 + 0.77086I$ $b = -1.87810 + 0.26325I$	$0.00239 + 4.33994I$	$-1.13631 - 6.98543I$
$u = 0.761643 + 0.208049I$ $a = 1.44027 - 1.30172I$ $b = 0.177943 + 1.296043I$	$-2.52120 - 5.50828I$	$-2.80497 + 6.25925I$
$u = 0.761643 - 0.208049I$ $a = 1.44027 + 1.30172I$ $b = 0.177943 - 1.296043I$	$-2.52120 + 5.50828I$	$-2.80497 - 6.25925I$
$u = -0.449566 - 1.164785I$ $a = 1.92707 - 0.90418I$ $b = -1.82941 + 2.34062I$	$-9.81146 + 6.17573I$	$-10.98134 - 7.44010I$
$u = -0.449566 + 1.164785I$ $a = 1.92707 + 0.90418I$ $b = -1.82941 - 2.34062I$	$-9.81146 - 6.17573I$	$-10.98134 + 7.44010I$
$u = 0.524355 + 1.163405I$ $a = 2.16655 - 1.00309I$ $b = -2.30372 + 2.02238I$	$-5.31595 + 10.31620I$	$-6.17560 - 9.61291I$
$u = 0.524355 - 1.163405I$ $a = 2.16655 + 1.00309I$ $b = -2.30372 - 2.02238I$	$-5.31595 - 10.31620I$	$-6.17560 + 9.61291I$
$u = 0.248527 - 0.782547I$ $a = 2.27476 - 2.17074I$ $b = -1.93781 + 0.58149I$	$-5.38286 - 3.26157I$	$-6.90177 + 8.91318I$
$u = 0.248527 + 0.782547I$ $a = 2.27476 + 2.17074I$ $b = -1.93781 - 0.58149I$	$-5.38286 + 3.26157I$	$-6.90177 - 8.91318I$

III.

$$I_3^u = \langle u^{13} - u^{12} + \dots - u + 1, u^{11} - u^{10} + \dots + b + 3, -2u^{12} + u^{11} + \dots + a - 2 \rangle$$

(i) Arc colorings

$$a_2 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$

$$a_1 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} u^2 + 1 \\ u^4 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -u^5 - 2u^3 - u \\ -u^7 - u^5 + u \end{pmatrix}$$

$$a_9 = \begin{pmatrix} 2u^{12} - u^{11} + 6u^{10} - u^9 + 8u^8 + u^7 + 2u^6 + 4u^5 - u^4 + 2u^3 + 2u + 2 \\ -u^{11} + u^{10} - 4u^9 + 3u^8 - 7u^7 + 4u^6 - 4u^5 + u^3 - 3u^2 + 2u - 3 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} 2u^{12} - u^{11} + 6u^{10} - 2u^9 + 8u^8 - u^7 + 2u^6 + 2u^5 - u^4 + 2u^3 + 2u + 2 \\ -u^{11} + u^{10} - 3u^9 + 3u^8 - 5u^7 + 4u^6 - 2u^5 + u^3 - 2u^2 + 2u - 2 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} -u \\ u \end{pmatrix}$$

$$a_8 = \begin{pmatrix} u^{12} + 3u^{10} + u^9 + 4u^8 + 3u^7 + u^6 + 3u^5 + u^2 + 2 \\ u^{12} - 2u^{11} + \dots + 4u - 3 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -u^{12} - u^{11} - 2u^{10} - 4u^9 - 2u^8 - 6u^7 - 3u^5 - u^4 + u^3 - 2u^2 - 3 \\ -2u^{12} + 3u^{11} + \dots - 5u + 3 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} u^{12} - 2u^{11} + \dots + 3u - 2 \\ -2u^{12} + 2u^{11} + \dots - 4u + 1 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} u^{12} - 2u^{11} + \dots + 3u - 2 \\ -2u^{12} + 2u^{11} + \dots - 4u + 1 \end{pmatrix}$$

(ii) Obstruction class = 1

(iii) Cusp Shapes = unknown

(iv) Complex Volumes and Cusp Shapes

Solution to $I_3^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.851574$ $a = 1.29542$ $b = 0.236834$	$-5.58548$	$-6.40048$
$u = -0.432945 - 1.190574I$ $a = 0.574206 - 0.848947I$ $b = -0.88235 + 1.94320I$	$-9.24726 + 4.36417I$	$-9.35230 - 3.32302I$
$u = -0.432945 + 1.190574I$ $a = 0.574206 + 0.848947I$ $b = -0.88235 - 1.94320I$	$-9.24726 - 4.36417I$	$-9.35230 + 3.32302I$
$u = -0.429348 - 0.836369I$ $a = -1.06443 + 0.95489I$ $b = 0.90233 - 1.19418I$	$1.50284 + 1.80144I$	$-0.975171 - 0.624326I$
$u = -0.429348 + 0.836369I$ $a = -1.06443 - 0.95489I$ $b = 0.90233 + 1.19418I$	$1.50284 - 1.80144I$	$-0.975171 + 0.624326I$
$u = 0.100465 - 0.707437I$ $a = 2.08183 - 1.26835I$ $b = -1.83693 - 0.64675I$	$-5.50214 - 2.30256I$	$-8.51436 + 0.38924I$
$u = 0.100465 + 0.707437I$ $a = 2.08183 + 1.26835I$ $b = -1.83693 + 0.64675I$	$-5.50214 + 2.30256I$	$-8.51436 - 0.38924I$
$u = 0.354755 - 1.099913I$ $a = 0.261043 + 1.280069I$ $b = 0.463549 - 0.404379I$	$-7.44002 + 0.06234I$	$-10.48891 + 0.49082I$
$u = 0.354755 + 1.099913I$ $a = 0.261043 - 1.280069I$ $b = 0.463549 + 0.404379I$	$-7.44002 - 0.06234I$	$-10.48891 - 0.49082I$
$u = 0.555159 - 1.145126I$ $a = -1.45591 - 0.17932I$ $b = 1.45752 + 1.05620I$	$-5.89830 - 7.73676I$	$-8.25887 + 7.75024I$

Solution to $I_3^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.555159 + 1.145126I$	$-5.89830 + 7.73676I$	$-8.25887 - 7.75024I$
$a = -1.45591 + 0.17932I$		
$b = 1.45752 - 1.05620I$		
$u = 0.777700 - 0.380482I$	$-3.52105 + 2.68668I$	$-6.71015 - 2.69355I$
$a = -0.544452 - 0.841459I$		
$b = -0.722544 + 0.675961I$		
$u = 0.777700 + 0.380482I$	$-3.52105 - 2.68668I$	$-6.71015 + 2.69355I$
$a = -0.544452 + 0.841459I$		
$b = -0.722544 - 0.675961I$		

$$\text{IV. } I_4^u = \langle u^{28} + 6u^{27} + \cdots + 26u + 4, -3u^{27} - 26u^{26} + \cdots + 2b - 6, 9u^{27} + 72u^{26} + \cdots + 4a + 84 \rangle$$

(i) Arc colorings

$$a_2 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$

$$a_1 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} u^2 + 1 \\ u^4 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -u^5 - 2u^3 - u \\ -u^7 - u^5 + u \end{pmatrix}$$

$$a_9 = \begin{pmatrix} -\frac{9}{4}u^{27} - 18u^{26} + \cdots - \frac{513}{4}u - 21 \\ \frac{3}{2}u^{27} + 13u^{26} + \cdots + \frac{7}{2}u + 3 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} \frac{11}{4}u^{27} + 14u^{26} + \cdots + \frac{143}{4}u + 5 \\ -\frac{5}{2}u^{27} - 15u^{26} + \cdots - \frac{1}{2}u - 11 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} -u \\ u \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -\frac{21}{4}u^{27} - 29u^{26} + \cdots - \frac{449}{4}u - 19 \\ \frac{9}{2}u^{27} + 24u^{26} + \cdots + \frac{45}{2}u + 1 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -\frac{1}{2}u^{27} - \frac{3}{2}u^{26} + \cdots - \frac{41}{2}u - \frac{7}{2} \\ -\frac{5}{2}u^{27} - 14u^{26} + \cdots - \frac{55}{2}u - 4 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} \frac{1}{2}u^{27} + \frac{9}{2}u^{26} + \cdots + \frac{73}{2}u + \frac{13}{2} \\ -\frac{1}{2}u^{27} - 3u^{26} + \cdots + \frac{7}{2}u + 2 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} \frac{1}{2}u^{27} + \frac{9}{2}u^{26} + \cdots + \frac{73}{2}u + \frac{13}{2} \\ -\frac{1}{2}u^{27} - 3u^{26} + \cdots + \frac{7}{2}u + 2 \end{pmatrix}$$

(ii) Obstruction class = -1

(iii) Cusp Shapes = unknown

(iv) Complex Volumes and Cusp Shapes

Solution to $I_4^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.007890 - 0.244456I$		
$a = 0.648218 - 0.649776I$	$-5.75558 - 1.16478I$	$-9.81484 + 5.25007I$
$b = 0.484897 + 0.362346I$		
$u = -1.007890 + 0.244456I$		
$a = 0.648218 + 0.649776I$	$-5.75558 + 1.16478I$	$-9.81484 - 5.25007I$
$b = 0.484897 - 0.362346I$		
$u = -0.877743 - 0.205256I$		
$a = -1.36751 + 0.95489I$	$-7.91511 - 11.38135I$	$-4.44423 + 5.90932I$
$b = -0.332382 - 1.109600I$		
$u = -0.877743 + 0.205256I$		
$a = -1.36751 - 0.95489I$	$-7.91511 + 11.38135I$	$-4.44423 - 5.90932I$
$b = -0.332382 + 1.109600I$		
$u = -0.608424 - 0.177740I$		
$a = 0.665110 + 0.192137I$	$1.04620 - 1.66789I$	$3.14449 + 2.66380I$
$b = -0.474963 + 0.907755I$		
$u = -0.608424 + 0.177740I$		
$a = 0.665110 - 0.192137I$	$1.04620 + 1.66789I$	$3.14449 - 2.66380I$
$b = -0.474963 - 0.907755I$		
$u = -0.586363 - 1.242355I$		
$a = 1.064323 - 0.381059I$	$-8.88695 + 6.88314I$	$-9.37455 - 6.80974I$
$b = -1.41368 + 1.21973I$		
$u = -0.586363 + 1.242355I$		
$a = 1.064323 + 0.381059I$	$-8.88695 - 6.88314I$	$-9.37455 + 6.80974I$
$b = -1.41368 - 1.21973I$		
$u = -0.554721 - 1.203484I$		
$a = -1.83799 + 0.92930I$	$-10.9151 + 16.6086I$	$-7.19926 - 9.00617I$
$b = 1.96223 - 2.11484I$		
$u = -0.554721 + 1.203484I$		
$a = -1.83799 - 0.92930I$	$-10.9151 - 16.6086I$	$-7.19926 + 9.00617I$
$b = 1.96223 + 2.11484I$		

Solution to $I_4^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.483475 - 1.130605I$ $a = 1.03565 - 1.24896I$ $b = -0.38060 + 1.45896I$	$-1.61917 + 5.94948I$	$-1.73292 - 6.08838I$
$u = -0.483475 + 1.130605I$ $a = 1.03565 + 1.24896I$ $b = -0.38060 - 1.45896I$	$-1.61917 - 5.94948I$	$-1.73292 + 6.08838I$
$u = -0.417630 - 1.105257I$ $a = -0.990060 + 0.503261I$ $b = 0.343945 - 0.624215I$	$-2.12382 + 1.70105I$	$-2.95787 - 0.05705I$
$u = -0.417630 + 1.105257I$ $a = -0.990060 - 0.503261I$ $b = 0.343945 + 0.624215I$	$-2.12382 - 1.70105I$	$-2.95787 + 0.05705I$
$u = -0.315106 - 1.262771I$ $a = 0.488001 - 0.002907I$ $b = 0.100408 - 1.021430I$	$-12.6068 - 7.4137I$	$-9.32623 + 3.45211I$
$u = -0.315106 + 1.262771I$ $a = 0.488001 + 0.002907I$ $b = 0.100408 + 1.021430I$	$-12.6068 + 7.4137I$	$-9.32623 - 3.45211I$
$u = -0.305330 - 0.675911I$ $a = -0.630555 - 0.172210I$ $b = 0.360299 - 0.412592I$	$-0.257625 + 1.154957I$	$-2.96071 - 5.77634I$
$u = -0.305330 + 0.675911I$ $a = -0.630555 + 0.172210I$ $b = 0.360299 + 0.412592I$	$-0.257625 - 1.154957I$	$-2.96071 + 5.77634I$
$u = -0.243939 - 1.326512I$ $a = -0.0674133 - 0.0418679I$ $b = -0.033141 + 1.007615I$	$-11.26133 + 3.02152I$	$-13.62827 - 2.14467I$
$u = -0.243939 + 1.326512I$ $a = -0.0674133 + 0.0418679I$ $b = -0.033141 - 1.007615I$	$-11.26133 - 3.02152I$	$-13.62827 + 2.14467I$

Solution to $I_4^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.433444 - 0.634083I$ $a = 1.80511 + 0.76581I$ $b = -1.031196 - 0.788265I$	$2.24308 - 1.31021I$	$4.48172 - 2.40271I$
$u = 0.433444 + 0.634083I$ $a = 1.80511 - 0.76581I$ $b = -1.031196 + 0.788265I$	$2.24308 + 1.31021I$	$4.48172 + 2.40271I$
$u = 0.450069 - 0.945327I$ $a = 0.97063 + 1.16479I$ $b = -0.92359 - 1.77022I$	$1.30775 - 2.44749I$	$-4.69640 + 9.53101I$
$u = 0.450069 + 0.945327I$ $a = 0.97063 - 1.16479I$ $b = -0.92359 + 1.77022I$	$1.30775 + 2.44749I$	$-4.69640 - 9.53101I$
$u = 0.693563 - 0.915180I$ $a = -1.289003 + 0.358838I$ $b = 1.64479 + 0.73716I$	$-3.67868 - 9.29135I$	$-4.02619 + 9.42557I$
$u = 0.693563 + 0.915180I$ $a = -1.289003 - 0.358838I$ $b = 1.64479 - 0.73716I$	$-3.67868 + 9.29135I$	$-4.02619 - 9.42557I$
$u = 0.823545 - 0.669603I$ $a = -0.244511 - 1.089613I$ $b = -0.807023 + 0.636285I$	$-2.90686 + 3.71581I$	$-3.96472 - 7.21162I$
$u = 0.823545 + 0.669603I$ $a = -0.244511 + 1.089613I$ $b = -0.807023 - 0.636285I$	$-2.90686 - 3.71581I$	$-3.96472 + 7.21162I$



## V. u-Polynomials

Crossings	u-Polynomials at each crossings
$c_1$	$(u^3 + u + 1)^4$ $(u^{10} - u^9 + 3u^8 - 3u^7 + 5u^6 - 5u^5 + 4u^4 - 4u^3 + 3u^2 - 2u + 1)^4$ $(u^{13} - u^{12} + \dots - u + 1)(u^{28} + 6u^{27} + \dots + 26u + 4)$
$c_2$	$(u^3 + 2u^2 + u - 1)^4$ $(u^{10} + 5u^9 + 13u^8 + 19u^7 + 17u^6 + 7u^5 - 2u^3 + u^2 + 2u + 1)^4$ $(u^{13} + 7u^{12} + \dots - 5u - 1)(u^{28} + 14u^{27} + \dots + 36u + 16)$
$c_3, c_8$	$(u^{12} - 6u^{10} + \dots + 8u + 1)(u^{13} - u^{12} + \dots + 3u + 1)$ $(u^{28} + u^{27} + \dots + 3u + 1)(u^{40} - u^{39} + \dots - 18u^2 + 1)$
$c_4, c_{10}$	$(u^{12} - 6u^{10} + \dots + 8u + 1)(u^{13} + u^{12} + \dots + 3u - 1)$ $(u^{28} + u^{27} + \dots + 3u + 1)(u^{40} - u^{39} + \dots - 18u^2 + 1)$
$c_5$	$(u^3 + u + 1)^4$ $(u^{10} - u^9 + 3u^8 - 3u^7 + 5u^6 - 5u^5 + 4u^4 - 4u^3 + 3u^2 - 2u + 1)^4$ $(u^{13} + u^{12} + \dots - u - 1)(u^{28} + 6u^{27} + \dots + 26u + 4)$
$c_6$	$(u - 1)^{12}$ $(u^{10} + 2u^9 - u^8 - 5u^7 - 3u^6 + 4u^5 + 12u^4 + 13u^3 + 5u^2 + u + 2)^4$ $(u^{13} - u^{12} + \dots + u - 1)(u^{28} + 6u^{27} + \dots + 1800u + 712)$
$c_7$	$(u^2 - u + 1)^{26}(u^{13} - 2u^{12} + \dots + 2u - 1)$ $(u^{28} + 29u^{27} + \dots + 118784u + 8192)$
$c_9, c_{11}$	$(u^{12} + 4u^{11} + \dots + 32u + 13)(u^{13} + 2u^{12} + \dots + 2u + 1)$ $(u^{28} - 2u^{27} + \dots - 2u + 1)(u^{40} + 11u^{39} + \dots + 644u + 61)$

## VI. Riley Polynomials

Crossings	Riley Polynomials at each crossings
$c_1, c_5$	$(y^3 + 2y^2 + y - 1)^4$ $(y^{10} + 5y^9 + 13y^8 + 19y^7 + 17y^6 + 7y^5 - 2y^3 + y^2 + 2y + 1)^4$ $(y^{13} + 7y^{12} + \dots - 5y - 1)(y^{28} + 14y^{27} + \dots + 36y + 16)$
$c_2$	$(y^3 - 2y^2 + 5y - 1)^4$ $(y^{10} + y^9 + 13y^8 + 11y^7 + 45y^6 + 35y^5 + 12y^4 + 2y^3 + 9y^2 - 2y + 1)^4$ $(y^{13} - y^{12} + \dots + 7y - 1)(y^{28} - 2y^{27} + \dots - 240y + 256)$
$c_3, c_{10}$	$(y^{12} - 12y^{11} + \dots - 36y + 1)(y^{13} - 15y^{12} + \dots - 9y - 1)$ $(y^{28} - 23y^{27} + \dots + 3y + 1)(y^{40} - 33y^{39} + \dots - 36y + 1)$
$c_4, c_8$	$(y^{12} - 12y^{11} + \dots - 36y + 1)(y^{13} - 15y^{12} + \dots - 9y - 1)$ $(y^{28} - 23y^{27} + \dots + 3y + 1)(y^{40} - 33y^{39} + \dots - 36y + 1)$
$c_6$	$(y - 1)^{12}$ $(4 + 19y + 47y^2 - 69y^3 + 16y^4 + 32y^5 - 17y^6 - 11y^7 + 15y^8 - 6y^9 + y^{10})^4$ $(y^{13} - 9y^{12} + \dots - 11y - 1)(y^{28} - 18y^{27} + \dots + 1943360y + 506944)$
$c_7$	$(y^2 + y + 1)^{26}(y^{13} + 2y^{12} + \dots - 2y - 1)$ $(y^{28} + 3y^{27} + \dots + 486539264y + 67108864)$
$c_9, c_{11}$	$(y^{12} + 8y^{11} + \dots + 848y + 169)(y^{13} + 2y^{12} + \dots - 2y - 1)$ $(y^{28} + 6y^{27} + \dots + 40y + 1)(y^{40} + 11y^{39} + \dots + 62528y + 3721)$