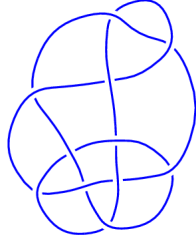
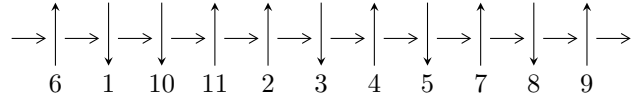


11a<sub>73</sub> (K11a<sub>73</sub>)

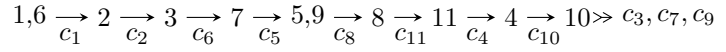


1

**Arc Sequences**



**Solving Sequence**



**Representation Ideals**

$$I = \bigcap_{i=1}^4 I_i^u \cap I_1^v$$

$$I_1^u = \langle a^4 + 4a^3 + 8a^2 + 11a + 7, b - 1, 2a^3 + 5a^2 + 9a + u + 10 \rangle$$

$$I_2^u = \langle u^{12} - u^{11} + 4u^{10} - 3u^9 + 7u^8 - 5u^7 + 7u^6 - 6u^5 + 6u^4 - 6u^3 + 4u^2 - 2u + 1, \\ -u^{11} - 4u^9 - u^8 - 6u^7 - u^6 - 4u^5 + u^4 - u^3 + 3u^2 + a - 1, \\ u^{11} + u^{10} + 2u^9 + 3u^8 + 2u^7 + 4u^6 + 2u^4 - u^3 + 2u^2 + b - 2u + 1 \rangle$$

$$I_3^u = \langle b^{62} + 5b^{61} + \dots + 30b + 1, 8.45059 \times 10^{187}b^{61} + 3.57490 \times 10^{188}b^{60} + \dots + 3.29870 \times 10^{187}a - 1.84581 \times 10^{187} \\ 6.59740 \times 10^{187}u + 1.97691 \times 10^{188}b^{61} + \dots + 1.54032 \times 10^{190}b + 6.73839 \times 10^{188} \rangle$$

$$I_4^u = \langle u^{41} - 6u^{40} + \dots + 5u - 1, -4430u^{40} + 27638u^{39} + \dots + 3011a - 6831, \\ -11711u^{40} + 64575u^{39} + \dots + 3011b - 10581 \rangle$$

$$I_1^v = \langle v + 1, b - 1, a \rangle$$

There are 5 irreducible components with 120 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>”

$$\text{I. } I_1^u = \langle a^4 + 4a^3 + 8a^2 + 11a + 7, b - 1, 2a^3 + 5a^2 + 9a + u + 10 \rangle$$

(i) Arc colorings

$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} 0 \\ -2a^3 - 5a^2 - 9a - 10 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} 1 \\ -2a^3 - 5a^2 - 9a - 9 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 2a^3 + 5a^2 + 9a + 10 \\ -2a^3 - 5a^2 - 9a - 9 \end{pmatrix}$$

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

$$a_5 = \begin{pmatrix} 2a^3 + 5a^2 + 9a + 10 \\ -2a^3 - 5a^2 - 9a - 9 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} a \\ 1 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} 2a^3 + 5a^2 + 9a + 9 \\ -3a^3 - 7a^2 - 12a - 12 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} a + 1 \\ 1 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 2a^3 + 5a^2 + 8a + 8 \\ -a^3 - 2a^2 - 4a - 4 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} a + 1 \\ 1 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} a + 1 \\ 1 \end{pmatrix}$$

(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
$u = -0.500000 + 0.866025I$ $a = -1.57070 - 0.10728I$ $b = 1.00000$	$1.64493 - 2.02988I$	$3.50000 + 6.06218I$
$u = -0.500000 - 0.866025I$ $a = -1.57070 + 0.10728I$ $b = 1.00000$	$1.64493 + 2.02988I$	$3.50000 - 6.06218I$
$u = -0.500000 + 0.866025I$ $a = -0.42930 - 1.62477I$ $b = 1.00000$	$1.64493 - 2.02988I$	$3.50000 + 6.06218I$
$u = -0.500000 - 0.866025I$ $a = -0.42930 + 1.62477I$ $b = 1.00000$	$1.64493 + 2.02988I$	$3.50000 - 6.06218I$

**II.**

$$I_2^u = \langle u^{12} - u^{11} + \dots - 2u + 1, -u^{11} - 4u^9 + \dots + a - 1, u^{11} + u^{10} + \dots + b + 1 \rangle$$

**(i) Arc colorings**

$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

$$a_2 = \begin{pmatrix} 1 \\ -u^2 \end{pmatrix}$$

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

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

$$a_5 = \begin{pmatrix} -u \\ u^3 + u \end{pmatrix}$$

$$a_9 = \begin{pmatrix} u^{11} + 4u^9 + u^8 + 6u^7 + u^6 + 4u^5 - u^4 + u^3 - 3u^2 + 1 \\ -u^{11} - u^{10} - 2u^9 - 3u^8 - 2u^7 - 4u^6 - 2u^4 + u^3 - 2u^2 + 2u - 1 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} u^{11} + 3u^9 + u^8 + 4u^7 + u^6 + 2u^5 - u^4 - 2u^2 - u + 1 \\ -u^{10} + u^9 - 3u^8 + 2u^7 - 4u^6 + 3u^5 - 3u^4 + 3u^3 - 3u^2 + 3u - 1 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} u^{11} - 2u^{10} + \dots + 7u - 2 \\ -u^{11} - 3u^9 - 4u^7 - 3u^5 + u^4 - 2u^3 + u^2 - u - 1 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -u^{11} - 2u^9 - u^8 - 2u^7 - 2u^6 - u^4 + 2u - 1 \\ -u^{11} + u^{10} - 3u^9 + 3u^8 - 4u^7 + 5u^6 - 3u^5 + 5u^4 - 3u^3 + 3u^2 - 2u \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} u^{11} - u^{10} + 3u^9 - 2u^8 + 4u^7 - 3u^6 + 3u^5 - 3u^4 + 3u^3 - 3u^2 + u + 1 \\ u^{11} - u^{10} + 4u^9 - 3u^8 + 6u^7 - 5u^6 + 5u^5 - 6u^4 + 4u^3 - 5u^2 + 3u - 1 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} u^{11} - u^{10} + 3u^9 - 2u^8 + 4u^7 - 3u^6 + 3u^5 - 3u^4 + 3u^3 - 3u^2 + u + 1 \\ u^{11} - u^{10} + 4u^9 - 3u^8 + 6u^7 - 5u^6 + 5u^5 - 6u^4 + 4u^3 - 5u^2 + 3u - 1 \end{pmatrix}$$

**(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
$u = -0.765338 - 0.701632I$		
$a = -0.773115 - 0.063272I$	$1.13372 + 2.84541I$	$8.3721 - 15.0712I$
$b = 0.457387 + 0.273460I$		
$u = -0.765338 + 0.701632I$		
$a = -0.773115 + 0.063272I$	$1.13372 - 2.84541I$	$8.3721 + 15.0712I$
$b = 0.457387 - 0.273460I$		
$u = -0.336660 - 1.205565I$		
$a = -0.133510 - 0.523237I$	$-4.16467 + 5.30019I$	$-0.64743 - 6.33134I$
$b = -0.312570 + 0.542789I$		
$u = -0.336660 + 1.205565I$		
$a = -0.133510 + 0.523237I$	$-4.16467 - 5.30019I$	$-0.64743 + 6.33134I$
$b = -0.312570 - 0.542789I$		
$u = 0.019153 - 0.707581I$		
$a = 2.19177 + 0.06943I$	$-1.41788 - 3.69137I$	$-2.25337 + 6.20418I$
$b = -0.128135 - 1.122209I$		
$u = 0.019153 + 0.707581I$		
$a = 2.19177 - 0.06943I$	$-1.41788 + 3.69137I$	$-2.25337 - 6.20418I$
$b = -0.128135 + 1.122209I$		
$u = 0.379767 - 1.126508I$		
$a = 1.10555 + 0.93951I$	$-3.89632 + 1.51522I$	$-4.76999 - 3.91912I$
$b = 0.28116 + 1.42256I$		
$u = 0.379767 + 1.126508I$		
$a = 1.10555 - 0.93951I$	$-3.89632 - 1.51522I$	$-4.76999 + 3.91912I$
$b = 0.28116 - 1.42256I$		
$u = 0.517643 - 1.141914I$		
$a = -1.75917 - 1.08825I$	$-2.88156 - 9.38139I$	$-2.89288 + 9.73442I$
$b = 0.67731 - 1.31649I$		
$u = 0.517643 + 1.141914I$		
$a = -1.75917 + 1.08825I$	$-2.88156 + 9.38139I$	$-2.89288 - 9.73442I$
$b = 0.67731 + 1.31649I$		

Solution to $I_2^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.685435 - 0.249226I$	$-0.28783 + 4.74486I$	$1.19154 - 6.65535I$
$a = -1.131528 - 0.408794I$		
$b = 0.524852 + 1.118493I$		
$u = 0.685435 + 0.249226I$	$-0.28783 - 4.74486I$	$1.19154 + 6.65535I$
$a = -1.131528 + 0.408794I$		
$b = 0.524852 - 1.118493I$		

$$\text{III. } I_3^u = \langle b^{62} + 5b^{61} + \dots + 30b + 1, 8.45 \times 10^{187} b^{61} + 3.57 \times 10^{188} b^{60} + \dots + 3.30 \times 10^{187} a - 1.85 \times 10^{188}, 6.60 \times 10^{187} u + 1.98 \times 10^{188} b^{61} + \dots + 1.54 \times 10^{190} b + 6.74 \times 10^{188} \rangle$$

(i) Arc colorings

$$\begin{aligned} a_1 &= \begin{pmatrix} 1 \\ 0 \end{pmatrix} \\ a_6 &= \begin{pmatrix} 0 \\ -2.99650b^{61} - 13.3804b^{60} + \dots - 233.473b - 10.2137 \end{pmatrix} \\ a_2 &= \begin{pmatrix} 1 \\ 0.384765b^{61} + 2.08717b^{60} + \dots - 62.2505b - 2.60692 \end{pmatrix} \\ a_3 &= \begin{pmatrix} -0.384765b^{61} - 2.08717b^{60} + \dots + 62.2505b + 3.60692 \\ 0.384765b^{61} + 2.08717b^{60} + \dots - 62.2505b - 2.60692 \end{pmatrix} \\ a_7 &= \begin{pmatrix} -2.98206b^{61} - 12.6000b^{60} + \dots - 77.9601b - 3.28437 \\ 1.36865b^{61} + 5.90259b^{60} + \dots + 17.9000b - 0.814275 \end{pmatrix} \\ a_5 &= \begin{pmatrix} 2.99650b^{61} + 13.3804b^{60} + \dots + 233.473b + 10.2137 \\ -1.38308b^{61} - 6.68299b^{60} + \dots - 173.413b - 6.11506 \end{pmatrix} \\ a_9 &= \begin{pmatrix} -2.56179b^{61} - 10.8373b^{60} + \dots + 90.6172b + 5.59555 \\ b \end{pmatrix} \\ a_8 &= \begin{pmatrix} -3.33836b^{61} - 14.7575b^{60} + \dots - 6.93737b + 2.82642 \\ -3.25809b^{61} - 15.5930b^{60} + \dots - 384.994b - 16.4149 \end{pmatrix} \\ a_{11} &= \begin{pmatrix} 1.97168b^{61} + 8.85697b^{60} + \dots + 82.4493b + 3.56179 \\ b^2 \end{pmatrix} \\ a_4 &= \begin{pmatrix} 6.15248b^{61} + 27.7797b^{60} + \dots + 467.407b + 18.7231 \\ -0.577984b^{61} - 2.90820b^{60} + \dots - 121.949b - 4.26896 \end{pmatrix} \\ a_{10} &= \begin{pmatrix} 2.66238b^{61} + 14.6153b^{60} + \dots + 587.267b + 25.1949 \\ -4.15609b^{61} - 20.6288b^{60} + \dots - 565.357b - 22.0903 \end{pmatrix} \\ a_{10} &= \begin{pmatrix} 2.66238b^{61} + 14.6153b^{60} + \dots + 587.267b + 25.1949 \\ -4.15609b^{61} - 20.6288b^{60} + \dots - 565.357b - 22.0903 \end{pmatrix} \end{aligned}$$

(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
$u = 0.423601 + 1.144366I$ $a = 1.84585 - 1.43049I$ $b = -1.19733 - 1.54730I$	$-5.31357 - 0.42431I$	$-6.76845 + 0.89097I$
$u = 0.423601 - 1.144366I$ $a = 1.84585 + 1.43049I$ $b = -1.19733 + 1.54730I$	$-5.31357 + 0.42431I$	$-6.76845 - 0.89097I$
$u = -0.442008 - 1.171674I$ $a = 0.742971 - 0.990301I$ $b = -1.076054 - 0.211669I$	$-5.69749 + 4.19773I$	$-6.88583 - 3.70112I$
$u = -0.442008 + 1.171674I$ $a = 0.742971 + 0.990301I$ $b = -1.076054 + 0.211669I$	$-5.69749 - 4.19773I$	$-6.88583 + 3.70112I$
$u = -0.562423 - 1.180726I$ $a = 1.54748 - 1.00626I$ $b = -1.006647 - 0.843864I$	$-5.26969 + 10.18345I$	$-4.99915 - 9.25403I$
$u = -0.562423 + 1.180726I$ $a = 1.54748 + 1.00626I$ $b = -1.006647 + 0.843864I$	$-5.26969 - 10.18345I$	$-4.99915 + 9.25403I$
$u = -0.729174$ $a = 1.49783$ $b = -0.962125$	$-2.34284$	$-3.47960$
$u = 0.470485 - 1.145183I$ $a = -1.312440 + 0.512271I$ $b = -0.95000 - 1.91169I$	$-4.86031 - 8.46017I$	$-5.41543 + 9.16645I$
$u = 0.470485 + 1.145183I$ $a = -1.312440 - 0.512271I$ $b = -0.95000 + 1.91169I$	$-4.88683 + 8.44747I$	$-5.41543 - 9.16645I$
$u = 0.576719 - 0.939494I$ $a = 1.56139 + 0.38632I$ $b = -0.912307 - 0.063353I$	$1.79992 - 1.42306I$	$5.96720 - 7.06639I$



Solution to $I_3^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.576719 + 0.939494I$ $a = 1.56139 - 0.38632I$ $b = -0.912307 + 0.063353I$	$1.79992 + 1.42306I$	$5.96720 + 7.06639I$
$u = -0.847519 + 0.248601I$ $a = 1.43877 + 0.44457I$ $b = -0.893298 - 0.771257I$	$-2.48415 + 4.99236I$	$-3.07968 - 5.91781I$
$u = -0.847519 - 0.248601I$ $a = 1.43877 - 0.44457I$ $b = -0.893298 + 0.771257I$	$-2.48415 - 4.99236I$	$-3.07968 + 5.91781I$
$u = 0.635699 + 0.077135I$ $a = 1.37652 + 1.04296I$ $b = -0.83111 - 1.61735I$	$-2.05368 - 4.22273I$	$-2.98921 + 5.90921I$
$u = 0.635699 - 0.077135I$ $a = 1.37652 - 1.04296I$ $b = -0.83111 + 1.61735I$	$-2.05368 + 4.22273I$	$-2.98921 - 5.90921I$
$u = -0.066980 - 0.843210I$ $a = 1.50981 + 0.90367I$ $b = -0.830677 - 0.572923I$	$-1.82841 - 2.63278I$	$-4.56232 + 0.80559I$
$u = -0.066980 + 0.843210I$ $a = 1.50981 - 0.90367I$ $b = -0.830677 + 0.572923I$	$-1.82841 + 2.63278I$	$-4.56232 - 0.80559I$
$u = 0.613097 + 0.623277I$ $a = 1.88374 - 1.08780I$ $b = -0.810431 - 0.123872I$	$2.71352 + 3.26681I$	$9.13719 - 8.60586I$
$u = 0.613097 - 0.623277I$ $a = 1.88374 + 1.08780I$ $b = -0.810431 + 0.123872I$	$2.71352 - 3.26681I$	$9.13719 + 8.60586I$
$u = -0.282165 + 1.228291I$ $a = -0.0693346 - 0.1131786I$ $b = -0.724830 - 0.935158I$	$-7.20604 + 1.39264I$	$-8.15870 - 2.08069I$

Solution to $I_3^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.282165 - 1.228291I$ $a = -0.0693346 + 0.1131786I$ $b = -0.724830 + 0.935158I$	$-7.20604 - 1.39264I$	$-8.15870 + 2.08069I$
$u = 0.700328 + 0.800493I$ $a = 1.146056 - 0.099237I$ $b = -0.574058 - 0.237024I$	$0.66027 + 2.65228I$	$-9.42163 - 5.74104I$
$u = 0.700328 - 0.800493I$ $a = 1.146056 + 0.099237I$ $b = -0.574058 + 0.237024I$	$0.66027 - 2.65228I$	$-9.42163 + 5.74104I$
$u = -0.442008 + 1.171674I$ $a = 0.252643 + 0.243666I$ $b = -0.549168 - 0.536294I$	$-5.69749 - 4.19773I$	$-6.88583 + 3.70112I$
$u = -0.442008 - 1.171674I$ $a = 0.252643 - 0.243666I$ $b = -0.549168 + 0.536294I$	$-5.69749 + 4.19773I$	$-6.88583 - 3.70112I$
$u = -0.688548 + 0.289520I$ $a = 0.88012 - 1.18793I$ $b = -0.486469 - 0.239705I$	$1.39266 + 4.80763I$	$7.37986 - 6.53110I$
$u = -0.688548 - 0.289520I$ $a = 0.88012 + 1.18793I$ $b = -0.486469 + 0.239705I$	$1.39266 - 4.80763I$	$7.37986 + 6.53110I$
$u = -0.526321 - 1.124114I$ $a = 0.64280 - 1.56277I$ $b = -0.384960 - 0.390707I$	$-1.03143 + 9.47799I$	$3.54432 - 9.88259I$
$u = -0.526321 + 1.124114I$ $a = 0.64280 + 1.56277I$ $b = -0.384960 + 0.390707I$	$-1.03143 - 9.47799I$	$3.54432 + 9.88259I$
$u = -0.729174$ $a = 1.16133$ $b = -0.335726$	$-2.34284$	$-3.47960$

Solution to $I_3^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.358609 + 1.074613I$ $a = -0.49075 - 1.65979I$ $b = -0.0812528 - 0.0525556I$	$-2.29804 + 2.01394I$	$0.79058 - 3.76194I$
$u = -0.358609 - 1.074613I$ $a = -0.49075 + 1.65979I$ $b = -0.0812528 + 0.0525556I$	$-2.29804 - 2.01394I$	$0.79058 + 3.76194I$
$u = -0.280769 + 0.672881I$ $a = -0.133027 + 0.453048I$ $b = -0.05617 - 1.63724I$	$-0.95364 - 4.69207I$	$0.70104 + 11.37557I$
$u = -0.280769 - 0.672881I$ $a = -0.133027 - 0.453048I$ $b = -0.05617 + 1.63724I$	$-0.95364 + 4.69207I$	$0.70104 - 11.37557I$
$u = -0.282165 - 1.228291I$ $a = 0.464148 - 0.295155I$ $b = 0.219790 - 1.134533I$	$-7.20604 - 1.39264I$	$-8.15870 + 2.08069I$
$u = -0.282165 + 1.228291I$ $a = 0.464148 + 0.295155I$ $b = 0.219790 + 1.134533I$	$-7.20604 + 1.39264I$	$-8.15870 - 2.08069I$
$u = -0.280769 + 0.672881I$ $a = -3.21056 + 1.44491I$ $b = 0.290721 - 0.533103I$	$-0.95364 - 4.69207I$	$0.70104 + 11.37557I$
$u = -0.280769 - 0.672881I$ $a = -3.21056 - 1.44491I$ $b = 0.290721 + 0.533103I$	$-0.95364 + 4.69207I$	$0.70104 - 11.37557I$
$u = 0.700328 - 0.800493I$ $a = -0.261910 + 0.128100I$ $b = 0.301124 - 0.295589I$	$0.66027 - 2.65228I$	$-9.42163 + 5.74104I$
$u = 0.700328 + 0.800493I$ $a = -0.261910 - 0.128100I$ $b = 0.301124 + 0.295589I$	$0.66027 + 2.65228I$	$-9.42163 - 5.74104I$

Solution to $I_3^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.066980 - 0.843210I$		
$a = 0.905300 - 1.065702I$	$-1.82841 - 2.63278I$	$-4.56232 + 0.80559I$
$b = 0.372827 - 1.045036I$		
$u = -0.066980 + 0.843210I$		
$a = 0.905300 + 1.065702I$	$-1.82841 + 2.63278I$	$-4.56232 - 0.80559I$
$b = 0.372827 + 1.045036I$		
$u = -0.847519 - 0.248601I$		
$a = -0.626669 + 0.783073I$	$-2.48415 - 4.99236I$	$-3.07968 + 5.91781I$
$b = 0.478939 - 1.042720I$		
$u = -0.847519 + 0.248601I$		
$a = -0.626669 - 0.783073I$	$-2.48415 + 4.99236I$	$-3.07968 - 5.91781I$
$b = 0.478939 + 1.042720I$		
$u = -0.562423 + 1.180726I$		
$a = -1.36886 - 0.47572I$	$-5.26969 - 10.18345I$	$-4.99915 + 9.25403I$
$b = 0.564223 - 1.182213I$		
$u = -0.562423 - 1.180726I$		
$a = -1.36886 + 0.47572I$	$-5.26969 + 10.18345I$	$-4.99915 - 9.25403I$
$b = 0.564223 + 1.182213I$		
$u = 0.635699 + 0.077135I$		
$a = -1.98473 - 0.26301I$	$-2.05368 - 4.22273I$	$-2.98921 + 5.90921I$
$b = 0.608283 - 0.905397I$		
$u = 0.635699 - 0.077135I$		
$a = -1.98473 + 0.26301I$	$-2.05368 + 4.22273I$	$-2.98921 - 5.90921I$
$b = 0.608283 + 0.905397I$		
$u = 0.423601 + 1.144366I$		
$a = 0.200693 - 0.558634I$	$-5.31357 - 0.42431I$	$-6.76845 + 0.89097I$
$b = 0.664215 - 1.092667I$		
$u = 0.423601 - 1.144366I$		
$a = 0.200693 + 0.558634I$	$-5.31357 + 0.42431I$	$-6.76845 - 0.89097I$
$b = 0.664215 + 1.092667I$		

Solution to $I_3^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.358609 - 1.074613I$		
$a = 1.247208 - 0.063972I$	$-2.29804 - 2.01394I$	$0.79058 + 3.76194I$
$b = 0.74515 - 1.66291I$		
$u = -0.358609 + 1.074613I$		
$a = 1.247208 + 0.063972I$	$-2.29804 + 2.01394I$	$0.79058 - 3.76194I$
$b = 0.74515 + 1.66291I$		
$u = 0.470485 - 1.145183I$		
$a = -2.00403 - 1.37416I$	$-4.97995 - 8.43248I$	$-5.41543 + 9.16645I$
$b = 0.787153 - 0.878249I$		
$u = 0.470485 + 1.145183I$		
$a = -2.00403 + 1.37416I$	$-4.97995 + 8.43248I$	$-5.41543 - 9.16645I$
$b = 0.787153 + 0.878249I$		
$u = 0.576719 + 0.939494I$		
$a = 0.06205 + 1.48991I$	$1.79992 + 1.42306I$	$5.96720 + 7.06639I$
$b = 0.971416 - 0.435463I$		
$u = 0.576719 - 0.939494I$		
$a = 0.06205 - 1.48991I$	$1.79992 - 1.42306I$	$5.96720 - 7.06639I$
$b = 0.971416 + 0.435463I$		
$u = 0.613097 - 0.623277I$		
$a = -1.44473 + 0.64813I$	$2.71352 - 3.26681I$	$9.13719 + 8.60586I$
$b = 1.074646 - 0.709661I$		
$u = 0.613097 + 0.623277I$		
$a = -1.44473 - 0.64813I$	$2.71352 + 3.26681I$	$9.13719 - 8.60586I$
$b = 1.074646 + 0.709661I$		
$u = -0.688548 - 0.289520I$		
$a = -1.56433 + 1.11235I$	$1.39266 - 4.80763I$	$7.37986 + 6.53110I$
$b = 1.14306 - 1.26502I$		
$u = -0.688548 + 0.289520I$		
$a = -1.56433 - 1.11235I$	$1.39266 + 4.80763I$	$7.37986 - 6.53110I$
$b = 1.14306 + 1.26502I$		
Solution to $I_3^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.526321 + 1.124114I$		
$a = -2.06575 - 1.23148I$	$-1.03143 - 9.47799I$	$3.54432 + 9.88259I$
$b = 1.29214 - 1.47017I$		
$u = -0.526321 - 1.124114I$		
$a = -2.06575 + 1.23148I$	$-1.03143 + 9.47799I$	$3.54432 - 9.88259I$
$b = 1.29214 + 1.47017I$		

$$\text{IV. } I_4^u = \langle u^{41} - 6u^{40} + \dots + 5u - 1, -4430u^{40} + 27638u^{39} + \dots + 3011a - 6831, -11711u^{40} + 64575u^{39} + \dots + 3011b - 10581 \rangle$$

(i) Arc colorings

$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

$$a_2 = \begin{pmatrix} 1 \\ -u^2 \end{pmatrix}$$

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

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

$$a_5 = \begin{pmatrix} -u \\ u^3 + u \end{pmatrix}$$

$$a_9 = \begin{pmatrix} 1.47127u^{40} - 9.17901u^{39} + \dots - 5.53836u + 2.26868 \\ 3.88941u^{40} - 21.4464u^{39} + \dots - 12.0956u + 3.51411 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -0.531385u^{40} - 0.883427u^{39} + \dots - 9.18931u + 3.76752 \\ 6.82431u^{40} - 39.2046u^{39} + \dots - 25.0438u + 5.73564 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} -0.591498u^{40} + 4.05413u^{39} + \dots + 5.08303u + 0.803720 \\ 1.64198u^{40} - 9.67021u^{39} + \dots - 8.71504u + 2.71837 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 0.209565u^{40} - 0.0640983u^{39} + \dots + 5.34341u - 3.59582 \\ 1.85586u^{40} - 8.46463u^{39} + \dots + 2.68615u - 1.43806 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} 5.73564u^{40} - 27.5895u^{39} + \dots - 8.76918u + 3.63434 \\ -4.07174u^{40} + 21.9807u^{39} + \dots + 6.42444u - 0.531385 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} 5.73564u^{40} - 27.5895u^{39} + \dots - 8.76918u + 3.63434 \\ -4.07174u^{40} + 21.9807u^{39} + \dots + 6.42444u - 0.531385 \end{pmatrix}$$

(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
$u = -0.725875 - 0.718682I$ $a = 0.83857 - 1.21867I$ $b = -0.903416 + 0.468519I$	$3.04955 - 5.79639I$	$4.67570 + 5.28890I$
$u = -0.725875 + 0.718682I$ $a = 0.83857 + 1.21867I$ $b = -0.903416 - 0.468519I$	$3.04955 + 5.79639I$	$4.67570 - 5.28890I$
$u = -0.717723$ $a = 1.31735$ $b = -0.635831$	$-2.35187$	$-3.23267$
$u = -0.680543 - 0.851083I$ $a = 1.65602 - 0.00258I$ $b = -1.067799 - 0.649528I$	$2.65853 + 11.08818I$	$3.28154 - 9.85902I$
$u = -0.680543 + 0.851083I$ $a = 1.65602 + 0.00258I$ $b = -1.067799 + 0.649528I$	$2.65853 - 11.08818I$	$3.28154 + 9.85902I$
$u = -0.536686 - 0.762150I$ $a = -2.07413 + 0.35216I$ $b = 1.26360 + 0.68186I$	$3.44275 + 3.84392I$	$9.44835 - 8.23646I$
$u = -0.536686 + 0.762150I$ $a = -2.07413 - 0.35216I$ $b = 1.26360 - 0.68186I$	$3.44275 - 3.84392I$	$9.44835 + 8.23646I$
$u = -0.515395 - 0.785309I$ $a = -1.03703 + 1.54909I$ $b = 1.242509 - 0.373109I$	$3.38107 + 0.44143I$	$9.27545 + 0.21018I$
$u = -0.515395 + 0.785309I$ $a = -1.03703 - 1.54909I$ $b = 1.242509 + 0.373109I$	$3.38107 - 0.44143I$	$9.27545 - 0.21018I$
$u = -0.455367 - 1.107238I$ $a = -1.04912 + 1.13395I$ $b = 1.50116 - 0.16642I$	$-0.93408 + 3.72501I$	$1.85741 - 3.78091I$

Solution to $I_4^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.455367 + 1.107238I$ $a = -1.04912 - 1.13395I$ $b = 1.50116 + 0.16642I$	$-0.93408 - 3.72501I$	$1.85741 + 3.78091I$
$u = -0.448486 - 1.175506I$ $a = 0.492889 - 0.632416I$ $b = -0.817436 + 0.184411I$	$-5.68068 + 4.22254I$	$-6.98279 - 3.15101I$
$u = -0.448486 + 1.175506I$ $a = 0.492889 + 0.632416I$ $b = -0.817436 - 0.184411I$	$-5.68068 - 4.22254I$	$-6.98279 + 3.15101I$
$u = -0.278824$ $a = -5.02278$ $b = 1.14650$	$1.63641$	$6.23629$
$u = 0.193943 - 0.889112I$ $a = 0.883549 - 0.178964I$ $b = 0.138077 - 0.486291I$	$-0.85333 - 1.82668I$	$-2.01304 + 4.52189I$
$u = 0.193943 + 0.889112I$ $a = 0.883549 + 0.178964I$ $b = 0.138077 + 0.486291I$	$-0.85333 + 1.82668I$	$-2.01304 - 4.52189I$
$u = 0.220242 - 1.309265I$ $a = 0.00788396 + 0.00223172I$ $b = -0.246595 + 0.581812I$	$-4.69336 - 5.76085I$	$-8.5485 + 14.3300I$
$u = 0.220242 + 1.309265I$ $a = 0.00788396 - 0.00223172I$ $b = -0.246595 - 0.581812I$	$-4.69336 + 5.76085I$	$-8.5485 - 14.3300I$
$u = 0.297512 - 1.244046I$ $a = -0.449120 - 0.044426I$ $b = -1.03032 - 1.16487I$	$-5.61358 + 9.45917I$	$-3.54182 - 5.35610I$
$u = 0.297512 + 1.244046I$ $a = -0.449120 + 0.044426I$ $b = -1.03032 + 1.16487I$	$-5.61358 - 9.45917I$	$-3.54182 + 5.35610I$



Solution to $I_4^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.337324 - 0.271834I$ $a = -0.07427 + 1.63066I$ $b = 0.823540 + 0.201797I$	$1.65904 + 0.03957I$	$6.61397 - 0.60191I$
$u = 0.337324 + 0.271834I$ $a = -0.07427 - 1.63066I$ $b = 0.823540 - 0.201797I$	$1.65904 - 0.03957I$	$6.61397 + 0.60191I$
$u = 0.362831 - 1.165210I$ $a = 1.070355 + 0.324888I$ $b = 0.79605 + 1.29861I$	$-2.85882 + 1.02122I$	$2.55146 - 1.96606I$
$u = 0.362831 + 1.165210I$ $a = 1.070355 - 0.324888I$ $b = 0.79605 - 1.29861I$	$-2.85882 - 1.02122I$	$2.55146 + 1.96606I$
$u = 0.454786 - 1.065101I$ $a = -0.31016 - 1.42726I$ $b = 0.511379 - 0.571103I$	$-0.42808 - 3.78436I$	$2.16188 + 5.53774I$
$u = 0.454786 + 1.065101I$ $a = -0.31016 + 1.42726I$ $b = 0.511379 + 0.571103I$	$-0.42808 + 3.78436I$	$2.16188 - 5.53774I$
$u = 0.506994 - 1.237050I$ $a = -0.343128 - 0.730701I$ $b = 0.837607 - 0.284107I$	$-2.86146 - 4.86399I$	$4.20516 + 7.12552I$
$u = 0.506994 + 1.237050I$ $a = -0.343128 + 0.730701I$ $b = 0.837607 + 0.284107I$	$-2.86146 + 4.86399I$	$4.20516 - 7.12552I$
$u = 0.514268 - 1.164383I$ $a = -1.64613 - 1.51432I$ $b = 1.15140 - 1.37689I$	$-1.79982 - 9.32852I$	$5.30321 + 9.39443I$
$u = 0.514268 + 1.164383I$ $a = -1.64613 + 1.51432I$ $b = 1.15140 + 1.37689I$	$-1.79982 + 9.32852I$	$5.30321 - 9.39443I$

Solution to $I_4^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.539684 - 1.034029I$ $a = 0.779420 + 0.504456I$ $b = -0.164278 + 0.300558I$	$-0.14735 - 2.61609I$	$2.94577 + 3.55552I$
$u = 0.539684 + 1.034029I$ $a = 0.779420 - 0.504456I$ $b = -0.164278 - 0.300558I$	$-0.14735 + 2.61609I$	$2.94577 - 3.55552I$
$u = 0.559000 - 1.189397I$ $a = 1.71865 + 1.26258I$ $b = -1.27637 + 1.18033I$	$-3.7858 - 18.4184I$	$-1.30933 + 10.58172I$
$u = 0.559000 + 1.189397I$ $a = 1.71865 - 1.26258I$ $b = -1.27637 - 1.18033I$	$-3.7858 + 18.4184I$	$-1.30933 - 10.58172I$
$u = 0.746103 - 0.183057I$ $a = -1.285706 - 0.387657I$ $b = 1.07761 + 1.20252I$	$1.05085 + 4.60926I$	$7.98736 - 6.22230I$
$u = 0.746103 + 0.183057I$ $a = -1.285706 + 0.387657I$ $b = 1.07761 - 1.20252I$	$1.05085 - 4.60926I$	$7.98736 + 6.22230I$
$u = 0.845612 - 0.498102I$ $a = 0.475474 - 0.261626I$ $b = -0.334988 + 0.050698I$	$1.33190 - 2.47162I$	$16.2458 + 1.2870I$
$u = 0.845612 + 0.498102I$ $a = 0.475474 + 0.261626I$ $b = -0.334988 - 0.050698I$	$1.33190 + 2.47162I$	$16.2458 - 1.2870I$
$u = 0.848782$ $a = -0.709994$ $b = 0.892393$	$0.744100$	$9.40897$
$u = 0.857936 - 0.229320I$ $a = 1.55370 + 0.62249I$ $b = -1.20325 - 1.09295I$	$-0.91359 + 13.22009I$	$1.63608 - 7.45702I$
Solution to $I_4^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.857936 + 0.229320I$ $a = 1.55370 - 0.62249I$ $b = -1.20325 + 1.09295I$	$-0.91359 - 13.22009I$	$1.63608 + 7.45702I$

$$\mathbf{V. } I_1^v = \langle v + 1, b - 1, a \rangle$$

**(i) Arc colorings**

$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} -1 \\ 0 \end{pmatrix}$$

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

$$a_3 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

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

$$a_9 = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -2 \\ -1 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

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

**(iii) Cusp Shapes =unknown**

(iv) Complex Volumes and Cusp Shapes

Solution to $I_1^v$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$v = -1.00000$		
$a = 0$	1.64493	6.00000
$b = 1.00000$		

## VI. u-Polynomials

Crossings	u-Polynomials at each crossings
$c_1$	$(u)(u^2 + u + 1)^2(u^{12} - u^{11} + \dots - 2u + 1)$ $(-1 + 2u - 3u^2 + 2u^3 + 3u^4 - 8u^5 + 16u^6 - 24u^7 + 26u^8 - 28u^9 + 10u^{10} + 28u^{11} - 76u^{12} +$ $(u^{41} + 6u^{40} + \dots + 5u + 1)$
$c_2$	$(u)(u^2 + u + 1)^2(u^{12} + 7u^{11} + \dots + 4u + 1)$ $(-1 - 2u + 5u^2 + 22u^3 + 11u^4 - 64u^5 - 120u^6 - 36u^7 + 90u^8 - 132u^9 - 942u^{10} - 1560u^{11} -$ $(u^{41} + 22u^{40} + \dots + 11u - 1)$
$c_3$	$(u - 1)(u^4 + u^3 - u^2 - u + 1)$ $(u^{12} - u^{11} + 2u^{10} - u^9 + 4u^8 - 3u^7 + 4u^6 - 2u^5 + 4u^4 - 3u^3 + 2u^2 - u + 1)$ $(u^{41} + 2u^{40} + \dots + 8u^2 - 1)(u^{62} - 4u^{60} + \dots - 391u + 173)$
$c_4$	$(u - 1)(u^4 + u^3 - u^2 - u + 1)$ $(u^{12} + u^{11} + 2u^{10} + 3u^9 + 4u^8 + 2u^7 + 4u^6 + 3u^5 + 4u^4 + u^3 + 2u^2 + u + 1)$ $(u^{41} + 2u^{40} + \dots - 24u^2 + 1)(u^{62} + 6u^{60} + \dots - u + 1)$
$c_5$	$(u)(u^2 - u + 1)^2(u^{12} + u^{11} + \dots + 2u + 1)$ $(-1 + 2u - 3u^2 + 2u^3 + 3u^4 - 8u^5 + 16u^6 - 24u^7 + 26u^8 - 28u^9 + 10u^{10} + 28u^{11} - 76u^{12} +$ $(u^{41} + 6u^{40} + \dots + 5u + 1)$
$c_6$	$u(u^2 + u + 1)^2$ $(u^{12} - u^{11} - u^{10} + u^9 - 3u^8 + 3u^7 + 11u^6 - 4u^5 - 14u^4 + u^3 + 6u^2 + 1)$ $(u^{41} + 6u^{40} + \dots - 1163u - 157)(u^{62} - 4u^{61} + \dots - 260u + 25)$
$c_7$	$(u - 1)(u^4 + u^3 - u^2 - u + 1)$ $(u^{12} + u^{11} + 2u^{10} + 3u^9 + 4u^8 + 2u^7 + 4u^6 + 3u^5 + 4u^4 + u^3 + 2u^2 + u + 1)$ $(u^{41} + 2u^{40} + \dots - 24u^2 + 1)(u^{62} + 6u^{60} + \dots - u + 1)$
$c_8$	$(u - 1)(u^4 + u^3 - u^2 - u + 1)$ $(u^{12} - u^{11} + 2u^{10} - u^9 + 4u^8 - 3u^7 + 4u^6 - 2u^5 + 4u^4 - 3u^3 + 2u^2 - u + 1)$ $(u^{41} + 2u^{40} + \dots + 8u^2 - 1)(u^{62} - 4u^{60} + \dots - 391u + 173)$
$c_9, c_{11}$	$(u - 1)^4(u + 1)(u^{12} - 3u^{11} + \dots - 3u + 1)(u^{41} + 6u^{40} + \dots + 4u - 1)$ $(u^{62} - 5u^{61} + \dots - 30u + 1)$
$c_{10}$	$u^5(u^{12} + 9u^{11} + \dots + 87u + 13)$ $(4 + 6u - 25u^2 - 93u^3 - 15u^4 + 400u^5 + 672u^6 - 336u^7 - 2412u^8 - 2436u^9 + 2242u^{10} + 786$ $(u^{41} - 22u^{40} + \dots + 25u^2 - 1)$

## VII. Riley Polynomials

Crossings	Riley Polynomials at each crossings
$c_1, c_5$	$(y)(y^2 + y + 1)^2(y^{12} + 7y^{11} + \dots + 4y + 1)$ $(-1 - 2y + 5y^2 + 22y^3 + 11y^4 - 64y^5 - 120y^6 - 36y^7 + 90y^8 - 132y^9 - 942y^{10} - 1560y^{11} - \dots)$ $(y^{41} + 22y^{40} + \dots + 11y - 1)$
$c_2$	$(y)(y^2 + y + 1)^2(y^{12} - y^{11} + \dots - 8y + 1)$ $(-1 + 14y - 91y^2 + 390y^3 - 1413y^4 + 2896y^5 - 2152y^6 - 4036y^7 + 4.24 \times 10^4 y^8 - 7.25 \times 10^4 y^9 - \dots)$ $(y^{41} - 2y^{40} + \dots + 119y - 1)$
$c_3$	$(y - 1)(y^4 - 3y^3 + \dots - 3y + 1)(y^{12} + 3y^{11} + \dots + 3y + 1)$ $(y^{41} - 10y^{40} + \dots + 16y - 1)(y^{62} - 8y^{61} + \dots - 1236207y + 29929)$
$c_4$	$(y - 1)(y^4 - 3y^3 + \dots - 3y + 1)(y^{12} + 3y^{11} + \dots + 3y + 1)$ $(y^{41} - 22y^{40} + \dots + 48y - 1)(y^{62} + 12y^{61} + \dots - 47y + 1)$
$c_6$	$(y)(y^2 + y + 1)^2(y^{12} - 3y^{11} + \dots + 12y + 1)$ $(y^{41} - 20y^{40} + \dots + 345571y - 24649)$ $(y^{62} - 32y^{61} + \dots + 26700y + 625)$
$c_7$	$(y - 1)(y^4 - 3y^3 + \dots - 3y + 1)(y^{12} + 3y^{11} + \dots + 3y + 1)$ $(y^{41} - 22y^{40} + \dots + 48y - 1)(y^{62} + 12y^{61} + \dots - 47y + 1)$
$c_8$	$(y - 1)(y^4 - 3y^3 + \dots - 3y + 1)(y^{12} + 3y^{11} + \dots + 3y + 1)$ $(y^{41} - 10y^{40} + \dots + 16y - 1)(y^{62} - 8y^{61} + \dots - 1236207y + 29929)$
$c_9$	$(y - 1)^5(y^{12} + 11y^{11} + \dots + 3y + 1)(y^{41} - 14y^{40} + \dots + 12y - 1)$ $(y^{62} + 23y^{61} + \dots - 104y + 1)$
$c_{10}$	$y^5(y^{12} + 5y^{11} + \dots - 263y + 169)(y^{41} + 10y^{39} + \dots + 50y - 1)$ $(y^{62} - 10y^{61} + \dots - 7552y + 256)$
$c_{11}$	$(y - 1)^5(y^{12} + 11y^{11} + \dots + 3y + 1)(y^{41} - 14y^{40} + \dots + 12y - 1)$ $(y^{62} + 23y^{61} + \dots - 104y + 1)$