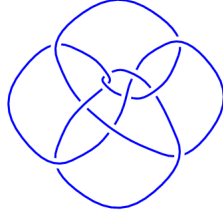
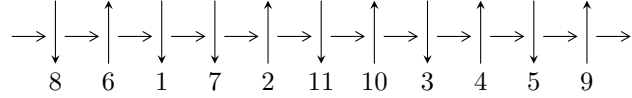


11a<sub>288</sub> (K11a<sub>288</sub>)

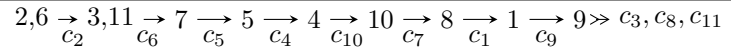


1

**Arc Sequences**



**Solving Sequence**



**Representation Ideals**

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

$$I_1^u = \langle u^5 + u^4 - u^3 - 2u^2 + u + 1, -u^3 - 2u^2 + b + 2, -u^4 + 2u^2 + a + u - 3 \rangle$$

$$I_2^u = \langle a^{24} - 7a^{23} + \dots + 24a + 12, 1.16206 \times 10^{42}b + 2.12026 \times 10^{40}a^{23} + \dots + 4.36480 \times 10^{42}a + 1.88488 \times 10^{42} \\ 7.74709 \times 10^{41}u - 5.74517 \times 10^{40}a^{23} + \dots - 7.05086 \times 10^{42}a + 8.98087 \times 10^{41} \rangle$$

$$I_3^u = \langle u^{31} + 4u^{30} + \dots + 50u + 28, \\ -1.17373 \times 10^{37}u^{30} - 4.38694 \times 10^{37}u^{29} + \dots + 3.48049 \times 10^{38}b - 5.60614 \times 10^{38}, \\ 9.61634 \times 10^{37}u^{30} + 3.32633 \times 10^{38}u^{29} + \dots + 1.62423 \times 10^{39}a + 6.66715 \times 10^{39} \rangle$$

$$I_4^u = \langle 25a^{100} + 125a^{99} + \dots - 48855a + 14149, \\ 6.78669 \times 10^{813}u - 2.82318 \times 10^{811}a^{99} + \dots + 3.61617 \times 10^{814}a + 3.13240 \times 10^{813}, \\ 4.75069 \times 10^{814}b + 2.34572 \times 10^{812}a^{99} + \dots + 1.14702 \times 10^{816}a - 1.70331 \times 10^{815} \rangle$$

There are 4 irreducible components with 160 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>”

$$I_1^u = \langle u^5 + u^4 - u^3 - 2u^2 + u + 1, -u^3 - 2u^2 + b + 2, -u^4 + 2u^2 + a + u - 3 \rangle \quad \mathbf{I.}$$

(i) Arc colorings

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

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

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

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

$$a_7 = \begin{pmatrix} 3u^4 + 2u^3 - 3u^2 - 4u + 4 \\ -2u^4 - 2u^3 + u^2 + 3u - 2 \end{pmatrix}$$

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

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

$$a_{10} = \begin{pmatrix} 2u^4 + u^3 - 2u^2 - 2u + 3 \\ -u^4 + 2u^2 + u - 2 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} 2u^4 + 2u^3 - u^2 - 2u + 2 \\ -u^4 - u^3 + u^2 + 2u - 1 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} 2u^4 - 4u^2 - 3u + 5 \\ -u^4 + 2u^2 + u - 3 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} 2u^4 + u^3 - 2u^2 - 2u + 3 \\ -u^4 + 2u^2 + u - 2 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} 2u^4 + u^3 - 2u^2 - 2u + 3 \\ -u^4 + 2u^2 + u - 2 \end{pmatrix}$$

(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            |
|--|---------------------------------------|-----------------------|
| $u = -1.116853 - 0.784420I$<br>$a = 0.182169 - 0.505011I$<br>$b = -0.067380 + 1.051628I$ | $1.84330 + 3.45949I$                  | $0.15254 - 11.15264I$ |
| $u = -1.116853 + 0.784420I$<br>$a = 0.182169 + 0.505011I$<br>$b = -0.067380 - 1.051628I$ | $1.84330 - 3.45949I$                  | $0.15254 + 11.15264I$ |
| $u = -0.575152$<br>$a = 3.02298$<br>$b = -1.52866$                                       | $-3.55538$                            | $-13.8517$            |
| $u = 0.904429 - 0.339760I$<br>$a = 0.806340 + 0.705367I$<br>$b = -0.16829 - 2.02370I$    | $4.86920 - 1.42206I$                  | $8.27331 + 8.69048I$  |
| $u = 0.904429 + 0.339760I$<br>$a = 0.806340 - 0.705367I$<br>$b = -0.16829 + 2.02370I$    | $4.86920 + 1.42206I$                  | $8.27331 - 8.69048I$  |

II.

$$I_2^u = \langle a^{24} - 7a^{23} + \dots + 24a + 12, 1.16 \times 10^{42}b + 2.12 \times 10^{40}a^{23} + \dots + 4.36 \times 10^{42}a + 1.88 \times 10^{42}, 7.75 \times 10^{41}u - 5.75 \times 10^{40}a^{23} + \dots - 7.05 \times 10^{42}a + 8.98 \times 10^{41} \rangle$$

(i) Arc colorings

$$\begin{aligned}
 a_2 &= \begin{pmatrix} 1 \\ 0 \end{pmatrix} \\
 a_6 &= \begin{pmatrix} 0 \\ 0.0741591a^{23} - 0.549117a^{22} + \dots + 9.10130a - 1.15926 \end{pmatrix} \\
 a_3 &= \begin{pmatrix} 1 \\ 0.171969a^{23} - 1.20756a^{22} + \dots + 16.0860a + 3.76647 \end{pmatrix} \\
 a_{11} &= \begin{pmatrix} a \\ -0.0182457a^{23} + 0.115392a^{22} + \dots - 3.75608a - 1.62201 \end{pmatrix} \\
 a_7 &= \begin{pmatrix} 0.00616182a^{23} - 0.0418328a^{22} + \dots + 0.169824a - 0.360043 \\ 0.0468508a^{23} - 0.353728a^{22} + \dots + 6.66781a - 0.870656 \end{pmatrix} \\
 a_5 &= \begin{pmatrix} -0.0741591a^{23} + 0.549117a^{22} + \dots - 9.10130a + 1.15926 \\ 0.0741591a^{23} - 0.549117a^{22} + \dots + 9.10130a - 1.15926 \end{pmatrix} \\
 a_4 &= \begin{pmatrix} -0.0566785a^{23} + 0.426659a^{22} + \dots - 7.39994a + 1.87337 \\ 0.0600670a^{23} - 0.398065a^{22} + \dots + 6.30817a + 3.42322 \end{pmatrix} \\
 a_{10} &= \begin{pmatrix} 0.0263103a^{23} - 0.214214a^{22} + \dots + 1.54601a - 1.72239 \\ -0.0445560a^{23} + 0.329606a^{22} + \dots - 4.30209a + 0.100381 \end{pmatrix} \\
 a_8 &= \begin{pmatrix} -0.0199099a^{23} + 0.117291a^{22} + \dots - 3.44628a - 2.61827 \\ 0.0414378a^{23} - 0.296329a^{22} + \dots + 6.18878a + 0.251002 \end{pmatrix} \\
 a_1 &= \begin{pmatrix} 0.0782217a^{23} - 0.567300a^{22} + \dots + 7.31450a + 0.602715 \\ 0.0217548a^{23} - 0.131516a^{22} + \dots + 0.930304a + 2.94396 \end{pmatrix} \\
 a_9 &= \begin{pmatrix} -0.119989a^{23} + 0.865851a^{22} + \dots - 11.8766a - 0.376524 \\ 0.0642672a^{23} - 0.454510a^{22} + \dots + 5.49160a - 0.249087 \end{pmatrix} \\
 a_9 &= \begin{pmatrix} -0.119989a^{23} + 0.865851a^{22} + \dots - 11.8766a - 0.376524 \\ 0.0642672a^{23} - 0.454510a^{22} + \dots + 5.49160a - 0.249087 \end{pmatrix}
 \end{aligned}$$

(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            |
|--|---------------------------------------|-----------------------|
| $u = 0.520258 - 0.093250I$<br>$a = -2.07840 - 1.72178I$<br>$b = 1.30096 + 2.77418I$      | $-0.47186 + 6.58662I$                 | $8.10608 - 10.95891I$ |
| $u = 0.520258 + 0.093250I$<br>$a = -2.07840 + 1.72178I$<br>$b = 1.30096 - 2.77418I$      | $-0.47186 - 6.58662I$                 | $8.10608 + 10.95891I$ |
| $u = 1.186541 - 0.501873I$<br>$a = -0.850091 - 0.944240I$<br>$b = 0.58518 + 1.47913I$    | $2.83828 - 9.79828I$                  | $0.33528 + 7.97194I$  |
| $u = 1.186541 + 0.501873I$<br>$a = -0.850091 + 0.944240I$<br>$b = 0.58518 - 1.47913I$    | $2.83828 + 9.79828I$                  | $0.33528 - 7.97194I$  |
| $u = -0.810098 + 0.637530I$<br>$a = -0.777373 - 0.220204I$<br>$b = 0.507033 - 0.542587I$ | $1.58921 - 5.87392I$                  | $1.28588 + 11.41546I$ |
| $u = -0.810098 - 0.637530I$<br>$a = -0.777373 + 0.220204I$<br>$b = 0.507033 + 0.542587I$ | $1.58921 + 5.87392I$                  | $1.28588 - 11.41546I$ |
| $u = -0.810098 - 0.637530I$<br>$a = -0.316042 - 1.237507I$<br>$b = -0.35512 + 2.28620I$  | $1.58921 + 5.87392I$                  | $1.28588 - 11.41546I$ |
| $u = -0.810098 + 0.637530I$<br>$a = -0.316042 + 1.237507I$<br>$b = -0.35512 - 2.28620I$  | $1.58921 - 5.87392I$                  | $1.28588 + 11.41546I$ |
| $u = 0.04829 - 1.42979I$<br>$a = -0.157580 - 0.303171I$<br>$b = -0.018588 + 0.270844I$   | $-1.01122 + 4.32869I$                 | $14.3327 - 16.3128I$  |
| $u = 0.04829 + 1.42979I$<br>$a = -0.157580 + 0.303171I$<br>$b = -0.018588 - 0.270844I$   | $-1.01122 - 4.32869I$                 | $14.3327 + 16.3128I$  |

| Solution to $I_2^u$  | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape           |
|--|---------------------------------------|----------------------|
| $u = -1.286398 - 0.289867I$<br>$a = -0.085626 - 0.356987I$<br>$b = 0.201060 + 1.251247I$ | $4.17779 - 0.93929I$                  | $0.56283 + 7.92150I$ |
| $u = -1.286398 + 0.289867I$<br>$a = -0.085626 + 0.356987I$<br>$b = 0.201060 - 1.251247I$ | $4.17779 + 0.93929I$                  | $0.56283 - 7.92150I$ |
| $u = 1.186541 + 0.501873I$<br>$a = 0.199294 - 1.131984I$<br>$b = -0.75465 + 2.25156I$    | $2.83828 + 9.79828I$                  | $0.33528 - 7.97194I$ |
| $u = 1.186541 - 0.501873I$<br>$a = 0.199294 + 1.131984I$<br>$b = -0.75465 - 2.25156I$    | $2.83828 - 9.79828I$                  | $0.33528 + 7.97194I$ |
| $u = -1.286398 + 0.289867I$<br>$a = 0.308317 - 0.744403I$<br>$b = 0.44009 + 1.88739I$    | $4.17779 + 0.93929I$                  | $0.56283 - 7.92150I$ |
| $u = -1.286398 - 0.289867I$<br>$a = 0.308317 + 0.744403I$<br>$b = 0.44009 - 1.88739I$    | $4.17779 - 0.93929I$                  | $0.56283 + 7.92150I$ |
| $u = 0.04829 + 1.42979I$<br>$a = 0.883927 - 0.160474I$<br>$b = -0.139492 - 0.367781I$    | $-1.01122 - 4.32869I$                 | $14.3327 + 16.3128I$ |
| $u = 0.04829 - 1.42979I$<br>$a = 0.883927 + 0.160474I$<br>$b = -0.139492 + 0.367781I$    | $-1.01122 + 4.32869I$                 | $14.3327 - 16.3128I$ |
| $u = 1.17015$<br>$a = 1.15482$<br>$b = -1.50272$   | $-1.34549$                            | $9.58474$            |
| $u = 1.17015$<br>$a = 2.23547$<br>$b = -1.37357$   | $-1.34549$                            | $9.58474$            |

| Solution to $I_2^u$  | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape            |
|--|---------------------------------------|-----------------------|
| $u = -0.487341$<br>$a = 2.29176 - 0.08082I$<br>$b = -0.385896 + 1.060534I$           | $-3.02932$                            | $-4.83036$            |
| $u = -0.487341$<br>$a = 2.29176 + 0.08082I$<br>$b = -0.385896 - 1.060534I$           | $-3.02932$                            | $-4.83036$            |
| $u = 0.520258 - 0.093250I$<br>$a = 2.38667 - 0.88630I$<br>$b = 0.057562 + 0.443989I$ | $-0.47186 + 6.58662I$                 | $8.10608 - 10.95891I$ |
| $u = 0.520258 + 0.093250I$<br>$a = 2.38667 + 0.88630I$<br>$b = 0.057562 - 0.443989I$ | $-0.47186 - 6.58662I$                 | $8.10608 + 10.95891I$ |

$$\text{III. } I_3^u = \langle u^{31} + 4u^{30} + \dots + 50u + 28, -1.17 \times 10^{37} u^{30} - 4.39 \times 10^{37} u^{29} + \dots + 3.48 \times 10^{38} b - 5.61 \times 10^{38}, 9.62 \times 10^{37} u^{30} + 3.33 \times 10^{38} u^{29} + \dots + 1.62 \times 10^{39} a + 6.67 \times 10^{39} \rangle$$

(i) Arc colorings

$$\begin{aligned} a_2 &= \begin{pmatrix} 1 \\ 0 \end{pmatrix} \\ a_6 &= \begin{pmatrix} 0 \\ u \end{pmatrix} \\ a_3 &= \begin{pmatrix} 1 \\ -u^2 \end{pmatrix} \\ a_{11} &= \begin{pmatrix} -0.0592055u^{30} - 0.204794u^{29} + \dots - 3.84139u - 4.10481 \\ 0.0337232u^{30} + 0.126044u^{29} + \dots + 0.934730u + 1.61073 \end{pmatrix} \\ a_7 &= \begin{pmatrix} 0.151056u^{30} + 0.489997u^{29} + \dots + 0.795159u + 7.14890 \\ -0.122699u^{30} - 0.410872u^{29} + \dots - 1.56871u - 4.93267 \end{pmatrix} \\ a_5 &= \begin{pmatrix} -u \\ u \end{pmatrix} \\ a_4 &= \begin{pmatrix} -0.208417u^{30} - 0.691487u^{29} + \dots - 2.50241u - 7.53909 \\ 0.142182u^{30} + 0.478536u^{29} + \dots + 2.88177u + 5.83569 \end{pmatrix} \\ a_{10} &= \begin{pmatrix} -0.0899122u^{30} - 0.296684u^{29} + \dots - 4.28680u - 4.75380 \\ 0.0644299u^{30} + 0.217933u^{29} + \dots + 1.38015u + 2.25973 \end{pmatrix} \\ a_8 &= \begin{pmatrix} 0.0575261u^{30} + 0.196381u^{29} + \dots - 0.668017u + 1.94158 \\ -0.0320277u^{30} - 0.102894u^{29} + \dots + 1.14453u - 1.65775 \end{pmatrix} \\ a_1 &= \begin{pmatrix} 0.176167u^{30} + 0.581968u^{29} + \dots + 3.39968u + 7.23962 \\ -0.114226u^{30} - 0.371582u^{29} + \dots - 0.403887u - 4.22956 \end{pmatrix} \\ a_9 &= \begin{pmatrix} 0.0807046u^{30} + 0.258388u^{29} + \dots - 1.88798u + 2.65508 \\ -0.0629653u^{30} - 0.199296u^{29} + \dots + 0.258194u - 2.51754 \end{pmatrix} \\ a_9 &= \begin{pmatrix} 0.0807046u^{30} + 0.258388u^{29} + \dots - 1.88798u + 2.65508 \\ -0.0629653u^{30} - 0.199296u^{29} + \dots + 0.258194u - 2.51754 \end{pmatrix} \end{aligned}$$

(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            |
|---|---------------------------------------|-----------------------|
| $u = -1.31560 - 0.78153I$<br>$a = -0.332936 + 0.555847I$<br>$b = 0.268473 - 1.044882I$  | $2.20531 + 3.28606I$                  | $18.4949 - 4.2675I$   |
| $u = -1.31560 + 0.78153I$<br>$a = -0.332936 - 0.555847I$<br>$b = 0.268473 + 1.044882I$  | $2.20531 - 3.28606I$                  | $18.4949 + 4.2675I$   |
| $u = -1.294073 - 0.080005I$<br>$a = -0.103323 - 0.456315I$<br>$b = -0.10883 + 1.73832I$ | $3.31474 - 0.89260I$                  | $-5.46909 + 7.98486I$ |
| $u = -1.294073 + 0.080005I$<br>$a = -0.103323 + 0.456315I$<br>$b = -0.10883 - 1.73832I$ | $3.31474 + 0.89260I$                  | $-5.46909 - 7.98486I$ |
| $u = -1.27757 - 0.69297I$<br>$a = 0.240200 - 1.209316I$<br>$b = -0.61551 + 2.28208I$    | $3.2833 + 20.2067I$                   | $1.01289 - 10.64976I$ |
| $u = -1.27757 + 0.69297I$<br>$a = 0.240200 + 1.209316I$<br>$b = -0.61551 - 2.28208I$    | $3.2833 - 20.2067I$                   | $1.01289 + 10.64976I$ |
| $u = -1.161457 - 0.451121I$<br>$a = -0.576807 + 1.199658I$<br>$b = 0.72419 - 1.55275I$  | $0.48261 + 1.92668I$                  | $-1.89690 + 0.93654I$ |
| $u = -1.161457 + 0.451121I$<br>$a = -0.576807 - 1.199658I$<br>$b = 0.72419 + 1.55275I$  | $0.48261 - 1.92668I$                  | $-1.89690 - 0.93654I$ |
| $u = -1.005065 - 0.357655I$<br>$a = -0.527410 + 0.901108I$<br>$b = 0.12622 - 2.15698I$  | $4.44624 + 0.88533I$                  | $2.97033 - 0.43256I$  |
| $u = -1.005065 + 0.357655I$<br>$a = -0.527410 - 0.901108I$<br>$b = 0.12622 + 2.15698I$  | $4.44624 - 0.88533I$                  | $2.97033 + 0.43256I$  |

| Solution to $I_3^u$   | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape            |
|---|---------------------------------------|-----------------------|
| $u = -0.723629$<br>$a = -3.18382$<br>$b = 2.05361$  | $-2.61872$                            | $-6.04378$            |
| $u = -0.396207 - 1.023044I$<br>$a = -0.636740 + 0.361485I$<br>$b = 0.641428 - 0.089594I$  | $-2.52139 + 3.24553I$                 | $-8.21889 - 3.28316I$ |
| $u = -0.396207 + 1.023044I$<br>$a = -0.636740 - 0.361485I$<br>$b = 0.641428 + 0.089594I$  | $-2.52139 - 3.24553I$                 | $-8.21889 + 3.28316I$ |
| $u = -0.378286 - 1.348700I$<br>$a = -0.458444 + 0.006364I$<br>$b = -0.051263 - 0.281323I$ | $-0.69495 + 3.65306I$                 | $9.41146 - 5.59206I$  |
| $u = -0.378286 + 1.348700I$<br>$a = -0.458444 - 0.006364I$<br>$b = -0.051263 + 0.281323I$ | $-0.69495 - 3.65306I$                 | $9.41146 + 5.59206I$  |
| $u = -0.360300 - 1.182786I$<br>$a = 1.103296 - 0.417720I$<br>$b = -0.093650 - 0.140490I$  | $0.34389 - 13.57868I$                 | $-0.70654 + 8.53646I$ |
| $u = -0.360300 + 1.182786I$<br>$a = 1.103296 + 0.417720I$<br>$b = -0.093650 + 0.140490I$  | $0.34389 + 13.57868I$                 | $-0.70654 - 8.53646I$ |
| $u = 0.030538 - 0.374368I$<br>$a = -1.82820 + 1.21307I$<br>$b = -0.211845 - 0.290068I$    | $1.97471 + 1.86806I$                  | $2.78153 - 1.05232I$  |
| $u = 0.030538 + 0.374368I$<br>$a = -1.82820 - 1.21307I$<br>$b = -0.211845 + 0.290068I$    | $1.97471 - 1.86806I$                  | $2.78153 + 1.05232I$  |
| $u = 0.304429 - 1.124816I$<br>$a = 0.675485 + 0.389260I$<br>$b = 0.376096 + 0.055294I$    | $-3.41746 + 4.90251I$                 | $-7.14123 - 8.81153I$ |

| Solution to $I_3^u$   | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape             |
|---|---------------------------------------|------------------------|
| $u = 0.304429 + 1.124816I$<br>$a = 0.675485 - 0.389260I$<br>$b = 0.376096 - 0.055294I$  | $-3.41746 - 4.90251I$                 | $-7.14123 + 8.81153I$  |
| $u = 0.417016 - 0.598371I$<br>$a = -1.188452 - 0.316372I$<br>$b = 0.388247 - 0.351147I$ | $-1.51628 + 0.70429I$                 | $-5.99175 - 2.53077I$  |
| $u = 0.417016 + 0.598371I$<br>$a = -1.188452 + 0.316372I$<br>$b = 0.388247 + 0.351147I$ | $-1.51628 - 0.70429I$                 | $-5.99175 + 2.53077I$  |
| $u = 0.902043 - 0.474320I$<br>$a = 0.656666 - 0.702604I$<br>$b = -0.78907 + 1.48003I$   | $3.74146 - 4.83276I$                  | $8.35445 + 8.23935I$   |
| $u = 0.902043 + 0.474320I$<br>$a = 0.656666 + 0.702604I$<br>$b = -0.78907 - 1.48003I$   | $3.74146 + 4.83276I$                  | $8.35445 - 8.23935I$   |
| $u = 1.073903 - 0.514023I$<br>$a = 0.035364 - 1.234227I$<br>$b = 0.30873 + 1.81516I$    | $0.39997 - 5.14043I$                  | $-3.97875 + 8.74276I$  |
| $u = 1.073903 + 0.514023I$<br>$a = 0.035364 + 1.234227I$<br>$b = 0.30873 - 1.81516I$    | $0.39997 + 5.14043I$                  | $-3.97875 - 8.74276I$  |
| $u = 1.261623 - 0.633674I$<br>$a = 0.174665 + 0.849997I$<br>$b = -0.56607 - 2.08801I$   | $-0.34268 - 11.10616I$                | $-2.89392 + 11.18360I$ |
| $u = 1.261623 + 0.633674I$<br>$a = 0.174665 - 0.849997I$<br>$b = -0.56607 + 2.08801I$   | $-0.34268 + 11.10616I$                | $-2.89392 - 11.18360I$ |
| $u = 1.56081 - 0.05643I$<br>$a = -0.177164 + 0.803435I$<br>$b = 0.57604 - 1.53659I$     | $7.70413 + 8.70305I$                  | $5.79340 - 7.62622I$   |
| Solution to $I_3^u$   | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape             |
| $u = 1.56081 + 0.05643I$<br>$a = -0.177164 - 0.803435I$<br>$b = 0.57604 + 1.53659I$     | $7.70413 - 8.70305I$                  | $5.79340 + 7.62622I$   |

$$\text{IV. } I_4^u = \langle 25a^{100} + 125a^{99} + \dots - 48855a + 14149, 6.79 \times 10^{813}u - 2.82 \times 10^{811}a^{99} + \dots + 3.62 \times 10^{814}a + 3.13 \times 10^{813}, 4.75 \times 10^{814}b + 2.35 \times 10^{812}a^{99} + \dots + 1.15 \times 10^{816}a - 1.70 \times 10^{815} \rangle$$

(i) Arc colorings

$$\begin{aligned} a_2 &= \begin{pmatrix} 1 \\ 0 \end{pmatrix} \\ a_6 &= \begin{pmatrix} 0 \\ 0.00415988a^{99} + 0.0220751a^{98} + \dots - 5.32832a - 0.461550 \end{pmatrix} \\ a_3 &= \begin{pmatrix} 1 \\ -0.0130846a^{99} - 0.0660813a^{98} + \dots - 74.9064a + 12.5557 \end{pmatrix} \\ a_{11} &= \begin{pmatrix} a \\ -0.00493764a^{99} - 0.0253931a^{98} + \dots - 24.1444a + 3.58541 \end{pmatrix} \\ a_7 &= \begin{pmatrix} 0.000835774a^{99} + 0.00473131a^{98} + \dots - 0.138687a + 0.722007 \\ 0.00348480a^{99} + 0.0170364a^{98} + \dots + 5.33455a - 6.35799 \end{pmatrix} \\ a_5 &= \begin{pmatrix} -0.00415988a^{99} - 0.0220751a^{98} + \dots + 5.32832a + 0.461550 \\ 0.00415988a^{99} + 0.0220751a^{98} + \dots - 5.32832a - 0.461550 \end{pmatrix} \\ a_4 &= \begin{pmatrix} -0.00490582a^{99} - 0.0254900a^{98} + \dots - 1.04622a + 2.94836 \\ 0.00641086a^{99} + 0.0363146a^{98} + \dots + 4.37950a + 9.21656 \end{pmatrix} \\ a_{10} &= \begin{pmatrix} -0.00396438a^{99} - 0.0190419a^{98} + \dots - 30.3614a + 8.85090 \\ -0.000973255a^{99} - 0.00635128a^{98} + \dots + 7.21698a - 5.26549 \end{pmatrix} \\ a_8 &= \begin{pmatrix} -0.00509525a^{99} - 0.0268663a^{98} + \dots - 23.1562a + 1.09246 \\ 0.00659989a^{99} + 0.0319575a^{98} + \dots + 28.4092a - 15.5341 \end{pmatrix} \\ a_1 &= \begin{pmatrix} 0.00833474a^{99} + 0.0383658a^{98} + \dots + 52.3421a - 22.0113 \\ -0.00236016a^{99} - 0.00377786a^{98} + \dots - 38.6939a + 35.7396 \end{pmatrix} \\ a_9 &= \begin{pmatrix} -0.00411726a^{99} - 0.0215942a^{98} + \dots + 2.96589a - 0.679527 \\ 0.0140376a^{99} + 0.0749377a^{98} + \dots + 18.7160a + 2.41371 \end{pmatrix} \\ a_9 &= \begin{pmatrix} -0.00411726a^{99} - 0.0215942a^{98} + \dots + 2.96589a - 0.679527 \\ 0.0140376a^{99} + 0.0749377a^{98} + \dots + 18.7160a + 2.41371 \end{pmatrix} \end{aligned}$$

(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             |
|---|---------------------------------------|------------------------|
| $u = -0.468862 - 0.251297I$<br>$a = -2.69365 - 0.17002I$<br>$b = 0.282213 + 0.395657I$  | $-0.77161 - 6.39968I$                 | $-10.97216 - 0.34215I$ |
| $u = -0.468862 + 0.251297I$<br>$a = -2.69365 + 0.17002I$<br>$b = 0.282213 - 0.395657I$  | $-0.77161 + 6.39968I$                 | $-10.97216 + 0.34215I$ |
| $u = 1.29400$<br>$a = -2.06557$<br>$b = 1.22113$  | $-1.60735$                            | $-22.6749$             |
| $u = 0.661065 - 0.201573I$<br>$a = -1.92246 - 0.73103I$<br>$b = 0.494207 + 0.092846I$   | $-2.96398 - 1.0000I$                  | $-4.93204 + 6.02487I$  |
| $u = 0.661065 + 0.201573I$<br>$a = -1.92246 + 0.73103I$<br>$b = 0.494207 - 0.092846I$   | $-2.96398 + 1.0000I$                  | $-4.93204 - 6.02487I$  |
| $u = 0.868601 - 0.770886I$<br>$a = -1.50545 - 0.37355I$<br>$b = 0.383379 + 0.258294I$   | $-0.74310 + 2.60526I$                 | $-7.22323 - 1.31301I$  |
| $u = 0.868601 + 0.770886I$<br>$a = -1.50545 + 0.37355I$<br>$b = 0.383379 - 0.258294I$   | $-0.74310 - 2.60526I$                 | $-7.22323 + 1.31301I$  |
| $u = -0.299438 + 0.660743I$<br>$a = -1.41384 - 0.64732I$<br>$b = -0.256429 - 0.280957I$ | $1.22345 + 5.39271I$                  | $3.60568 - 7.27334I$   |
| $u = -0.299438 - 0.660743I$<br>$a = -1.41384 + 0.64732I$<br>$b = -0.256429 + 0.280957I$ | $1.22345 - 5.39271I$                  | $3.60568 + 7.27334I$   |
| $u = 0.310212 - 0.659807I$<br>$a = -1.23985 - 0.76467I$<br>$b = 0.153267 - 0.244681I$   | $-1.97473 + 1.08010I$                 | $-6.48617 - 1.37548I$  |

| Solution to $I_4^u$   | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape            |
|---|---------------------------------------|-----------------------|
| $u = 0.310212 + 0.659807I$<br>$a = -1.23985 + 0.76467I$<br>$b = 0.153267 + 0.244681I$     | $-1.97473 - 1.08010I$                 | $-6.48617 + 1.37548I$ |
| $u = -0.812718 - 0.561361I$<br>$a = -1.155505 - 0.127579I$<br>$b = -0.059019 + 0.196243I$ | $1.85560 - 0.04601I$                  | $3.11402 - 1.05223I$  |
| $u = -0.812718 + 0.561361I$<br>$a = -1.155505 + 0.127579I$<br>$b = -0.059019 - 0.196243I$ | $1.85560 + 0.04601I$                  | $3.11402 + 1.05223I$  |
| $u = 0.310212 + 0.659807I$<br>$a = -1.104297 - 0.645172I$<br>$b = 0.109271 + 1.079879I$   | $-1.97473 - 1.08010I$                 | $-6.48617 + 1.37548I$ |
| $u = 0.310212 - 0.659807I$<br>$a = -1.104297 + 0.645172I$<br>$b = 0.109271 - 1.079879I$   | $-1.97473 + 1.08010I$                 | $-6.48617 - 1.37548I$ |
| $u = 0.661065 - 0.201573I$<br>$a = -1.05939 - 1.52054I$<br>$b = 1.52817 + 1.54024I$       | $-2.96398 - 1.0000I$                  | $-4.93204 + 6.02487I$ |
| $u = 0.661065 + 0.201573I$<br>$a = -1.05939 + 1.52054I$<br>$b = 1.52817 - 1.54024I$       | $-2.96398 + 1.0000I$                  | $-4.93204 - 6.02487I$ |
| $u = 0.23704 - 1.49901I$<br>$a = -1.027476 - 0.141793I$<br>$b = 0.236776 - 0.342810I$     | $-1.17810 + 4.31731I$                 | $-33.0454 - 14.3498I$ |
| $u = 0.23704 + 1.49901I$<br>$a = -1.027476 + 0.141793I$<br>$b = 0.236776 + 0.342810I$     | $-1.17810 - 4.31731I$                 | $-33.0454 + 14.3498I$ |
| $u = 1.29400$<br>$a = -0.852393$<br>$b = 1.24083$   | $-1.60735$                            | $-22.6749$            |

| Solution to $I_4^u$  | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape             |
|--|---------------------------------------|------------------------|
| $u = 0.701301 - 0.482229I$<br>$a = -0.835282 - 1.036591I$<br>$b = 0.85337 + 2.49894I$    | $-1.26220 - 7.42402I$                 | $-2.60909 + 11.71667I$ |
| $u = 0.701301 + 0.482229I$<br>$a = -0.835282 + 1.036591I$<br>$b = 0.85337 - 2.49894I$    | $-1.26220 + 7.42402I$                 | $-2.60909 - 11.71667I$ |
| $u = -0.595267$<br>$a = -0.708553 - 0.899853I$<br>$b = -0.496901 + 0.258106I$            | 2.22273                               | 4.86778                |
| $u = -0.595267$<br>$a = -0.708553 + 0.899853I$<br>$b = -0.496901 - 0.258106I$            | 2.22273                               | 4.86778                |
| $u = 1.108721 + 0.368281I$<br>$a = -0.62690 - 1.53101I$<br>$b = 0.64626 + 1.86945I$      | $4.78147 - 2.43283I$                  | $7.67024 + 6.52709I$   |
| $u = 1.108721 - 0.368281I$<br>$a = -0.62690 + 1.53101I$<br>$b = 0.64626 - 1.86945I$      | $4.78147 + 2.43283I$                  | $7.67024 - 6.52709I$   |
| $u = 0.714215 - 0.033943I$<br>$a = -0.53194 - 1.63098I$<br>$b = -0.80009 + 1.95170I$     | $2.52892 - 4.60236I$                  | $5.46658 + 4.68357I$   |
| $u = 0.714215 + 0.033943I$<br>$a = -0.53194 + 1.63098I$<br>$b = -0.80009 - 1.95170I$     | $2.52892 + 4.60236I$                  | $5.46658 - 4.68357I$   |
| $u = -0.548941 - 0.850283I$<br>$a = -0.465235 - 0.008645I$<br>$b = 0.183186 - 1.033692I$ | $0.54701 + 3.37624I$                  | $-0.71362 - 9.25407I$  |
| $u = -0.548941 + 0.850283I$<br>$a = -0.465235 + 0.008645I$<br>$b = 0.183186 + 1.033692I$ | $0.54701 - 3.37624I$                  | $-0.71362 + 9.25407I$  |

| Solution to $I_4^u$  | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape             |
|--|---------------------------------------|------------------------|
| $u = -1.38998 - 0.36438I$<br>$a = -0.413514 - 0.616610I$<br>$b = -0.68269 + 1.69872I$    | $4.42644 - 0.76806I$                  | $23.3332 - 6.3616I$    |
| $u = -1.38998 + 0.36438I$<br>$a = -0.413514 + 0.616610I$<br>$b = -0.68269 - 1.69872I$    | $4.42644 + 0.76806I$                  | $23.3332 + 6.3616I$    |
| $u = -1.067606 - 0.768264I$<br>$a = -0.410089 - 0.423220I$<br>$b = 0.305652 + 0.894325I$ | $2.32102 + 5.65331I$                  | $11.0972 - 9.2113I$    |
| $u = -1.067606 + 0.768264I$<br>$a = -0.410089 + 0.423220I$<br>$b = 0.305652 - 0.894325I$ | $2.32102 - 5.65331I$                  | $11.0972 + 9.2113I$    |
| $u = -1.110177 + 0.404435I$<br>$a = -0.344526 - 1.359602I$<br>$b = 0.99100 + 2.31011I$   | $1.44032 - 9.60257I$                  | $-3.75808 + 10.80850I$ |
| $u = -1.110177 - 0.404435I$<br>$a = -0.344526 + 1.359602I$<br>$b = 0.99100 - 2.31011I$   | $1.44032 + 9.60257I$                  | $-3.75808 - 10.80850I$ |
| $u = -1.308863 + 0.523454I$<br>$a = -0.270859 - 0.582955I$<br>$b = -0.64545 + 1.38928I$  | $3.40486 - 2.98616I$                  | $10.12255 + 7.98921I$  |
| $u = -1.308863 - 0.523454I$<br>$a = -0.270859 + 0.582955I$<br>$b = -0.64545 - 1.38928I$  | $3.40486 + 2.98616I$                  | $10.12255 - 7.98921I$  |
| $u = 1.33427 - 0.71530I$<br>$a = -0.201273 - 1.254115I$<br>$b = 0.56026 + 2.23127I$      | $2.25912 - 11.62680I$                 | $-0.22704 + 11.90664I$ |
| $u = 1.33427 + 0.71530I$<br>$a = -0.201273 + 1.254115I$<br>$b = 0.56026 - 2.23127I$      | $2.25912 + 11.62680I$                 | $-0.22704 - 11.90664I$ |



| Solution to $I_4^u$   | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape            |
|---|---------------------------------------|-----------------------|
| $u = 1.067756 - 0.532641I$<br>$a = -0.193278 - 1.211126I$<br>$b = 0.68118 + 2.06724I$     | $0.09660 - 5.64563I$                  | $-5.19754 + 6.35243I$ |
| $u = 1.067756 + 0.532641I$<br>$a = -0.193278 + 1.211126I$<br>$b = 0.68118 - 2.06724I$     | $0.09660 + 5.64563I$                  | $-5.19754 - 6.35243I$ |
| $u = -1.122585 + 0.526509I$<br>$a = -0.128970 - 1.098142I$<br>$b = 0.72963 + 2.36764I$    | $3.61514 - 10.02166I$                 | $10.2132 + 12.4118I$  |
| $u = -1.122585 - 0.526509I$<br>$a = -0.128970 + 1.098142I$<br>$b = 0.72963 - 2.36764I$    | $3.61514 + 10.02166I$                 | $10.2132 - 12.4118I$  |
| $u = -0.548941 + 0.850283I$<br>$a = -0.100628 - 0.829100I$<br>$b = -0.053753 + 0.261772I$ | $0.54701 - 3.37624I$                  | $-0.71362 + 9.25407I$ |
| $u = -0.548941 - 0.850283I$<br>$a = -0.100628 + 0.829100I$<br>$b = -0.053753 - 0.261772I$ | $0.54701 + 3.37624I$                  | $-0.71362 - 9.25407I$ |
| $u = -1.38998 - 0.36438I$<br>$a = -0.036251 - 0.369483I$<br>$b = 0.115205 + 1.060957I$    | $4.42644 - 0.76806I$                  | $23.3332 - 6.3616I$   |
| $u = -1.38998 + 0.36438I$<br>$a = -0.036251 + 0.369483I$<br>$b = 0.115205 - 1.060957I$    | $4.42644 + 0.76806I$                  | $23.3332 + 6.3616I$   |
| $u = -0.812718 + 0.561361I$<br>$a = -0.011506 - 0.960618I$<br>$b = 0.067119 + 0.874093I$  | $1.85560 + 0.04601I$                  | $3.11402 + 1.05223I$  |
| $u = -0.812718 - 0.561361I$<br>$a = -0.011506 + 0.960618I$<br>$b = 0.067119 - 0.874093I$  | $1.85560 - 0.04601I$                  | $3.11402 - 1.05223I$  |

| Solution to $I_4^u$  | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape            |
|--|---------------------------------------|-----------------------|
| $u = -1.308863 - 0.523454I$<br>$a = 0.001393 - 0.514623I$<br>$b = -0.188341 + 0.906021I$ | $3.40486 + 2.98616I$                  | $10.12255 - 7.98921I$ |
| $u = -1.308863 + 0.523454I$<br>$a = 0.001393 + 0.514623I$<br>$b = -0.188341 - 0.906021I$ | $3.40486 - 2.98616I$                  | $10.12255 + 7.98921I$ |
| $u = -1.067606 + 0.768264I$<br>$a = 0.060674 - 0.898621I$<br>$b = 0.35306 + 2.22513I$    | $2.32102 - 5.65331I$                  | $11.0972 + 9.2113I$   |
| $u = -1.067606 - 0.768264I$<br>$a = 0.060674 + 0.898621I$<br>$b = 0.35306 - 2.22513I$    | $2.32102 + 5.65331I$                  | $11.0972 - 9.2113I$   |
| $u = 1.108721 - 0.368281I$<br>$a = 0.139927 - 0.358043I$<br>$b = -0.96050 + 1.20490I$    | $4.78147 + 2.43283I$                  | $7.67024 - 6.52709I$  |
| $u = 1.108721 + 0.368281I$<br>$a = 0.139927 + 0.358043I$<br>$b = -0.96050 - 1.20490I$    | $4.78147 - 2.43283I$                  | $7.67024 + 6.52709I$  |
| $u = 1.016923 - 0.224360I$<br>$a = 0.165406 - 0.500149I$<br>$b = -0.99970 + 1.95656I$    | $5.85957 - 0.63163I$                  | $13.37806 + 1.18653I$ |
| $u = 1.016923 + 0.224360I$<br>$a = 0.165406 + 0.500149I$<br>$b = -0.99970 - 1.95656I$    | $5.85957 + 0.63163I$                  | $13.37806 - 1.18653I$ |
| $u = 0.23704 + 1.49901I$<br>$a = 0.200442 - 0.286461I$<br>$b = -0.141009 + 0.107353I$    | $-1.17810 - 4.31731I$                 | $-33.0454 + 14.3498I$ |
| $u = 0.23704 - 1.49901I$<br>$a = 0.200442 + 0.286461I$<br>$b = -0.141009 - 0.107353I$    | $-1.17810 + 4.31731I$                 | $-33.0454 - 14.3498I$ |

| Solution to $I_4^u$         | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape             |
|-----------------------------|---------------------------------------|------------------------|
| $u = 0.868601 - 0.770886I$  |                                       |                        |
| $a = 0.204304 - 0.220576I$  | $-0.74310 + 2.60526I$                 | $-7.22323 - 1.31301I$  |
| $b = -0.661003 - 0.232071I$ |                                       |                        |
| $u = 0.868601 + 0.770886I$  |                                       |                        |
| $a = 0.204304 + 0.220576I$  | $-0.74310 - 2.60526I$                 | $-7.22323 + 1.31301I$  |
| $b = -0.661003 + 0.232071I$ |                                       |                        |
| $u = 1.232478 + 0.465944I$  |                                       |                        |
| $a = 0.273347 - 0.544995I$  | $4.22116 + 10.84980I$                 | $6.12886 - 10.98899I$  |
| $b = 0.96071 + 1.49463I$    |                                       |                        |
| $u = 1.232478 - 0.465944I$  |                                       |                        |
| $a = 0.273347 + 0.544995I$  | $4.22116 - 10.84980I$                 | $6.12886 + 10.98899I$  |
| $b = 0.96071 - 1.49463I$    |                                       |                        |
| $u = -1.45898$              |                                       |                        |
| $a = 0.291301 - 0.961522I$  | $7.96610$                             | $7.90668$              |
| $b = -0.69714 + 1.63124I$   |                                       |                        |
| $u = -1.45898$              |                                       |                        |
| $a = 0.291301 + 0.961522I$  | $7.96610$                             | $7.90668$              |
| $b = -0.69714 - 1.63124I$   |                                       |                        |
| $u = 1.33427 + 0.71530I$    |                                       |                        |
| $a = 0.345832 - 0.668777I$  | $2.25912 + 11.62680I$                 | $-0.22704 - 11.90664I$ |
| $b = -0.541393 + 1.170098I$ |                                       |                        |
| $u = 1.33427 - 0.71530I$    |                                       |                        |
| $a = 0.345832 + 0.668777I$  | $2.25912 - 11.62680I$                 | $-0.22704 + 11.90664I$ |
| $b = -0.541393 - 1.170098I$ |                                       |                        |
| $u = 1.232478 + 0.465944I$  |                                       |                        |
| $a = 0.348058 - 1.005306I$  | $4.22116 + 10.84980I$                 | $6.12886 - 10.98899I$  |
| $b = -0.79544 + 2.16138I$   |                                       |                        |
| $u = 1.232478 - 0.465944I$  |                                       |                        |
| $a = 0.348058 + 1.005306I$  | $4.22116 - 10.84980I$                 | $6.12886 + 10.98899I$  |
| $b = -0.79544 - 2.16138I$   |                                       |                        |

| Solution to $I_4^u$   | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape             |
|---|---------------------------------------|------------------------|
| $u = -0.135481 + 0.857453I$<br>$a = 0.458698 - 1.013239I$<br>$b = 0.210514 - 0.033301I$ | $0.34967 - 6.29766I$                  | $-1.51708 + 11.49060I$ |
| $u = -0.135481 - 0.857453I$<br>$a = 0.458698 + 1.013239I$<br>$b = 0.210514 + 0.033301I$ | $0.34967 + 6.29766I$                  | $-1.51708 - 11.49060I$ |
| $u = 1.174888 - 0.341252I$<br>$a = 0.469452 - 0.993791I$<br>$b = 0.55126 + 1.87526I$    | $5.24587 - 6.28986I$                  | $6.81428 + 6.10581I$   |
| $u = 1.174888 + 0.341252I$<br>$a = 0.469452 + 0.993791I$<br>$b = 0.55126 - 1.87526I$    | $5.24587 + 6.28986I$                  | $6.81428 - 6.10581I$   |
| $u = -0.836854 - 0.310102I$<br>$a = 0.486859 - 0.732068I$<br>$b = -1.08351 + 2.34191I$  | $-2.83417 + 1.43022I$                 | $-1.90225 - 5.13073I$  |
| $u = -0.836854 + 0.310102I$<br>$a = 0.486859 + 0.732068I$<br>$b = -1.08351 - 2.34191I$  | $-2.83417 - 1.43022I$                 | $-1.90225 + 5.13073I$  |
| $u = -0.891678$<br>$a = 0.635116 - 0.587375I$<br>$b = 1.35873 + 1.21436I$               | 2.18885                               | 3.18031                |
| $u = -0.891678$<br>$a = 0.635116 + 0.587375I$<br>$b = 1.35873 - 1.21436I$               | 2.18885                               | 3.18031                |
| $u = 0.701301 + 0.482229I$<br>$a = 0.652529 - 0.841822I$<br>$b = 0.333757 - 0.206749I$  | $-1.26220 + 7.42402I$                 | $-2.60909 - 11.71667I$ |
| $u = 0.701301 - 0.482229I$<br>$a = 0.652529 + 0.841822I$<br>$b = 0.333757 + 0.206749I$  | $-1.26220 - 7.42402I$                 | $-2.60909 + 11.71667I$ |

| Solution to $I_4^u$   | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape             |
|---|---------------------------------------|------------------------|
| $u = -1.122585 - 0.526509I$<br>$a = 0.65534 - 1.76831I$<br>$b = -0.57251 + 2.43134I$  | $3.61514 + 10.02166I$                 | $10.2132 - 12.4118I$   |
| $u = -1.122585 + 0.526509I$<br>$a = 0.65534 + 1.76831I$<br>$b = -0.57251 - 2.43134I$  | $3.61514 - 10.02166I$                 | $10.2132 + 12.4118I$   |
| $u = 1.174888 + 0.341252I$<br>$a = 0.677825 - 1.137037I$<br>$b = -0.93802 + 2.01476I$ | $5.24587 + 6.28986I$                  | $6.81428 - 6.10581I$   |
| $u = 1.174888 - 0.341252I$<br>$a = 0.677825 + 1.137037I$<br>$b = -0.93802 - 2.01476I$ | $5.24587 - 6.28986I$                  | $6.81428 + 6.10581I$   |
| $u = 1.067756 - 0.532641I$<br>$a = 0.915607 - 0.861146I$<br>$b = -0.39524 + 1.44712I$ | $0.09660 - 5.64563I$                  | $-5.19754 + 6.35243I$  |
| $u = 1.067756 + 0.532641I$<br>$a = 0.915607 + 0.861146I$<br>$b = -0.39524 - 1.44712I$ | $0.09660 + 5.64563I$                  | $-5.19754 - 6.35243I$  |
| $u = -0.468862 - 0.251297I$<br>$a = 0.95324 - 2.84635I$<br>$b = -1.42944 + 2.54717I$  | $-0.77161 - 6.39968I$                 | $-10.97216 - 0.34215I$ |
| $u = -0.468862 + 0.251297I$<br>$a = 0.95324 + 2.84635I$<br>$b = -1.42944 - 2.54717I$  | $-0.77161 + 6.39968I$                 | $-10.97216 + 0.34215I$ |
| $u = 1.016923 + 0.224360I$<br>$a = 0.954989 - 0.929737I$<br>$b = -0.63766 + 1.93908I$ | $5.85957 + 0.63163I$                  | $13.37806 - 1.18653I$  |
| $u = 1.016923 - 0.224360I$<br>$a = 0.954989 + 0.929737I$<br>$b = -0.63766 - 1.93908I$ | $5.85957 - 0.63163I$                  | $13.37806 + 1.18653I$  |

| Solution to $I_4^u$   | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape             |
|---|---------------------------------------|------------------------|
| $u = -0.135481 + 0.857453I$<br>$a = 0.967912 - 0.415367I$<br>$b = 0.21535 + 1.47165I$   | $0.34967 - 6.29766I$                  | $-1.51708 + 11.49060I$ |
| $u = -0.135481 - 0.857453I$<br>$a = 0.967912 + 0.415367I$<br>$b = 0.21535 - 1.47165I$   | $0.34967 + 6.29766I$                  | $-1.51708 - 11.49060I$ |
| $u = -0.836854 - 0.310102I$<br>$a = 1.402649 - 0.107963I$<br>$b = 0.316913 + 0.205285I$ | $-2.83417 + 1.43022I$                 | $-1.90225 - 5.13073I$  |
| $u = -0.836854 + 0.310102I$<br>$a = 1.402649 + 0.107963I$<br>$b = 0.316913 - 0.205285I$ | $-2.83417 - 1.43022I$                 | $-1.90225 + 5.13073I$  |
| $u = -0.299438 - 0.660743I$<br>$a = 1.94999 - 0.65464I$<br>$b = -0.934551 + 0.493487I$  | $1.22345 - 5.39271I$                  | $3.60568 + 7.27334I$   |
| $u = -0.299438 + 0.660743I$<br>$a = 1.94999 + 0.65464I$<br>$b = -0.934551 - 0.493487I$  | $1.22345 + 5.39271I$                  | $3.60568 - 7.27334I$   |
| $u = 0.714215 + 0.033943I$<br>$a = 2.00284 - 0.08379I$<br>$b = -0.838563 - 0.807506I$   | $2.52892 + 4.60236I$                  | $5.46658 - 4.68357I$   |
| $u = 0.714215 - 0.033943I$<br>$a = 2.00284 + 0.08379I$<br>$b = -0.838563 + 0.807506I$   | $2.52892 - 4.60236I$                  | $5.46658 + 4.68357I$   |
| $u = -1.110177 + 0.404435I$<br>$a = 2.14598 - 0.04888I$<br>$b = -1.54307 + 0.32154I$    | $1.44032 - 9.60257I$                  | $-3.75808 + 10.80850I$ |
| $u = -1.110177 - 0.404435I$<br>$a = 2.14598 + 0.04888I$<br>$b = -1.54307 - 0.32154I$    | $1.44032 + 9.60257I$                  | $-3.75808 - 10.80850I$ |

### V. u-Polynomials

| Crossings | u-Polynomials at each crossings  |
|-----------|--|
| $c_1$     | $(u^5 + u^4 + \dots + u + 1)(u^{24} - 5u^{22} + \dots + 36u + 12)$<br>$(u^{31} + 7u^{30} + \dots + 96u + 12)(u^{100} - 5u^{99} + \dots + 169334u + 14149)$   |
| $c_2$     | $(u^5 + u^4 - u^3 - 2u^2 + u + 1)$<br>$(u^{12} - 2u^{10} - u^8 + 8u^6 + 2u^5 - 10u^4 - 5u^3 + 6u^2 + u - 1)^2$<br>$(u^{31} + 4u^{30} + \dots + 50u + 28)$<br>$(-5 + 53u^2 + 8u^3 - 272u^4 - 57u^5 + 858u^6 + 235u^7 - 1885u^8 - 844u^9 + 3521u^{10} + 2366u^{11} - \dots)$ |
| $c_3$     | $(u^5 + u^3 + 2u^2 + 1)(u^{24} + 5u^{23} + \dots - 11u^2 - 3)(u^{31} + 2u^{30} + \dots - 9u - 3)$<br>$(u^{100} + 6u^{99} + \dots - 6u - 1)$  |
| $c_4$     | $(u^5 + u^3 - 2u^2 - 1)(u^{24} - 5u^{23} + \dots - 11u^2 - 3)(u^{31} + 2u^{30} + \dots - 9u - 3)$<br>$(u^{100} + 6u^{99} + \dots - 6u - 1)$  |
| $c_5$     | $(u^5 - u^4 - u^3 + 2u^2 + u - 1)$<br>$(u^{12} - 2u^{10} - u^8 + 8u^6 - 2u^5 - 10u^4 + 5u^3 + 6u^2 - u - 1)^2$<br>$(u^{31} + 4u^{30} + \dots + 50u + 28)$<br>$(-5 + 53u^2 + 8u^3 - 272u^4 - 57u^5 + 858u^6 + 235u^7 - 1885u^8 - 844u^9 + 3521u^{10} + 2366u^{11} - \dots)$ |
| $c_6$     | $(u^5 - u^4 + \dots + u - 1)(u^{24} - 5u^{22} + \dots - 36u + 12)$<br>$(u^{31} + 7u^{30} + \dots + 96u + 12)(u^{100} - 5u^{99} + \dots + 169334u + 14149)$   |
| $c_7$     | $(u^5 + 4u^4 + \dots - 2u - 1)(u^{24} + 3u^{23} + \dots - u + 1)$<br>$(u^{31} + 4u^{30} + \dots - 3u + 1)(u^{100} + 2u^{99} + \dots - 37u - 1)$  |
| $c_8$     | $(u^5 + 2u^3 - u^2 - 1)(3u^{24} + 3u^{23} + \dots + 2u - 1)$<br>$(3u^{31} + 6u^{30} + \dots + 5u + 1)(u^{100} - 10u^{98} + \dots - 18u - 1)$   |
| $c_9$     | $u^5(3u^{24} - 16u^{22} + \dots + 343u^2 - 137)(3u^{31} - 9u^{30} + \dots + 832u - 128)$<br>$(49 - 21u - 468u^2 + 307u^3 + 2195u^4 - 2215u^5 - 7111u^6 + 1.07 \times 10^4 u^7 + 1.83 \times 10^4 u^8 - 3.4 \times 10^4 u^9 + \dots)$                                       |
| $c_{10}$  | $(u^5 + 2u^3 + u^2 + 1)(3u^{24} - 3u^{23} + \dots - 2u - 1)$<br>$(3u^{31} + 6u^{30} + \dots + 5u + 1)(u^{100} - 10u^{98} + \dots - 18u - 1)$   |
| $c_{11}$  | $(u^5 - 4u^4 + \dots - 2u + 1)(u^{24} - 3u^{23} + \dots + u + 1)$<br>$(u^{31} + 4u^{30} + \dots - 3u + 1)(u^{100} + 2u^{99} + \dots - 37u - 1)$  |

## VI. Riley Polynomials

| Crossings  | Riley Polynomials at each crossings  |
|------------|--|
| $c_1, c_6$ | $(y^5 - 5y^4 + \dots + 3y - 1)(y^{24} - 10y^{23} + \dots + 192y + 144)$ $(y^{31} + 5y^{30} + \dots - 1776y - 144)$ $(y^{100} - 3y^{99} + \dots + 8842579308y + 200194201)$   |
| $c_2, c_5$ | $(y^5 - 3y^4 + 7y^3 - 8y^2 + 5y - 1)$ $(1 - 13y + 66y^2 - 165y^3 + 218y^4 - 172y^5 + 58y^6 + 36y^7 - 51y^8 + 20y^9 + 2y^{10} - 4y^{11} + y^{12})^2$ $(y^{31} - 12y^{30} + \dots - 7860y - 784)$ $(25 - 530y + 5529y^2 - 3.75 \times 10^4 y^3 + 1.85 \times 10^5 y^4 - 7.09 \times 10^5 y^5 + 2.24 \times 10^6 y^6 - 6.16 \times 10^6 y^7 + \dots)$ |
| $c_3$      | $(y^5 + 2y^4 + \dots - 4y - 1)(y^{24} - 9y^{23} + \dots + 66y + 9)$ $(y^{31} - 6y^{30} + \dots + 51y - 9)(y^{100} + 12y^{99} + \dots + 44y + 1)$   |
| $c_4$      | $(y^5 + 2y^4 + \dots - 4y - 1)(y^{24} - 9y^{23} + \dots + 66y + 9)$ $(y^{31} - 6y^{30} + \dots + 51y - 9)(y^{100} + 12y^{99} + \dots + 44y + 1)$   |
| $c_7$      | $(y^5 - 8y^4 + \dots + 2y - 1)(y^{24} - 3y^{23} + \dots - 5y + 1)$ $(y^{31} + 2y^{30} + \dots + 3y - 1)(y^{100} - 16y^{99} + \dots - 3373y + 1)$   |
| $c_8$      | $(y^5 + 4y^4 + \dots - 2y - 1)(9y^{24} - 33y^{23} + \dots + 24y + 1)$ $(9y^{31} + 120y^{30} + \dots + 9y - 1)(y^{100} - 20y^{99} + \dots + 154y + 1)$  |
| $c_9$      | $y^5$ $(-137 + 343y - 197y^2 + 166y^3 + 134y^4 - 361y^5 + 490y^6 - 518y^7 + 367y^8 - 204y^9 + 78y^{10} - \dots)$ $(9y^{31} + 57y^{30} + \dots + 331776y - 16384)$ $(2401 - 4.63 \times 10^4 y + 4.47 \times 10^5 y^2 - 2.94 \times 10^6 y^3 + 1.51 \times 10^7 y^4 - 6.48 \times 10^7 y^5 + 2.42 \times 10^8 y^6 - \dots)$                         |
| $c_{10}$   | $(y^5 + 4y^4 + \dots - 2y - 1)(9y^{24} - 33y^{23} + \dots + 24y + 1)$ $(9y^{31} + 120y^{30} + \dots + 9y - 1)(y^{100} - 20y^{99} + \dots + 154y + 1)$  |
| $c_{11}$   | $(y^5 - 8y^4 + \dots + 2y - 1)(y^{24} - 3y^{23} + \dots - 5y + 1)$ $(y^{31} + 2y^{30} + \dots + 3y - 1)(y^{100} - 16y^{99} + \dots - 3373y + 1)$   |