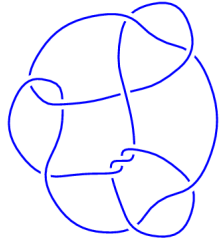
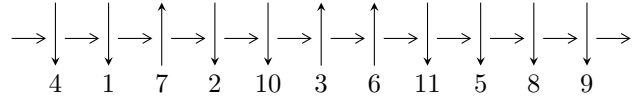


11a₂₂ (K11a₂₂)

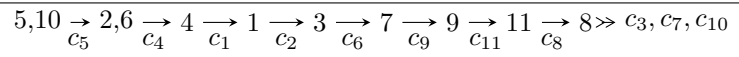


1

Arc Sequences



Solving Sequence



Representation Ideals

$$I = \bigcap_{i=1}^3 I_i^u$$

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

$$I_2^u = \langle u^6 + u^5 - u^4 - 2u^3 + u + 1, a, u^4 + u^3 + b - u \rangle$$

$$\begin{aligned} I_3^u = & \langle u^{58} + 4u^{57} + \dots + 14u + 1, \\ & -1.39321 \times 10^{15}u^{57} - 9.52584 \times 10^{14}u^{56} + \dots + 4.71171 \times 10^{15}b + 1.69695 \times 10^{15}, \\ & -2.84174 \times 10^{16}u^{57} - 9.16487 \times 10^{16}u^{56} + \dots + 9.42343 \times 10^{15}a - 9.46213 \times 10^{16} \rangle \end{aligned}$$

There are 3 irreducible components with 66 representations.

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

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

(i) Arc colorings

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

$$a_{10} = \begin{pmatrix} \frac{1}{2}b + \frac{1}{2} \\ b \end{pmatrix}$$

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

$$a_6 = \begin{pmatrix} -\frac{1}{2}b - \frac{3}{2} \\ -\frac{1}{2}b - \frac{3}{2} \end{pmatrix}$$

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

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

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

$$a_7 = \begin{pmatrix} -\frac{1}{2}b - \frac{3}{2} \\ -\frac{1}{2}b - \frac{3}{2} \end{pmatrix}$$

$$a_9 = \begin{pmatrix} \frac{1}{2}b + \frac{1}{2} \\ \frac{1}{2}b - \frac{1}{2} \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} -\frac{1}{2}b - \frac{3}{2} \\ -2 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -\frac{1}{2}b - \frac{3}{2} \\ -\frac{1}{2}b - \frac{3}{2} \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -\frac{1}{2}b - \frac{3}{2} \\ -\frac{1}{2}b - \frac{3}{2} \end{pmatrix}$$

(ii) Obstruction class = 1

(iii) Cusp Shapes = -21

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.00000$ $a = -0.618034$ $b = -2.23607$	-2.63189	-21.0000
$u = 1.00000$ $a = 1.61803$ $b = 2.23607$	-10.5276	-21.0000

$$\text{II. } I_2^u = \langle u^6 + u^5 - u^4 - 2u^3 + u + 1, a, u^4 + u^3 + b - u \rangle$$

(i) Arc colorings

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

$$a_{10} = \begin{pmatrix} 0 \\ -u^4 - u^3 + u \end{pmatrix}$$

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

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

$$a_4 = \begin{pmatrix} u \\ u \end{pmatrix}$$

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

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

$$a_7 = \begin{pmatrix} u^2 - 1 \\ u^4 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} 0 \\ -u^4 - u^3 + u \end{pmatrix}$$

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

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

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

(ii) Obstruction class = 1

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

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.073950 - 0.558752I$		
$a = 0$	$-1.64493 - 5.69302I$	$-8.89162 + 3.92918I$
$b = -0.108378 - 0.818891I$		
$u = -1.073950 + 0.558752I$		
$a = 0$	$-1.64493 + 5.69302I$	$-8.89162 - 3.92918I$
$b = -0.108378 + 0.818891I$		
$u = -0.428243 - 0.664531I$		
$a = 0$	$0.245672 + 0.924305I$	$-3.44826 - 0.47256I$
$b = -0.659772 - 0.298454I$		
$u = -0.428243 + 0.664531I$		
$a = 0$	$0.245672 - 0.924305I$	$-3.44826 + 0.47256I$
$b = -0.659772 + 0.298454I$		
$u = 1.002193 - 0.295542I$		
$a = 0$	$-3.53554 + 0.92430I$	$-13.66012 - 2.42665I$
$b = -0.23185 + 1.65564I$		
$u = 1.002193 + 0.295542I$		
$a = 0$	$-3.53554 - 0.92430I$	$-13.66012 + 2.42665I$
$b = -0.23185 - 1.65564I$		

$$\text{III. } I_3^u = \langle u^{58} + 4u^{57} + \dots + 14u + 1, -1.39 \times 10^{15} u^{57} - 9.53 \times 10^{14} u^{56} + \dots + 4.71 \times 10^{15} b + 1.70 \times 10^{15}, -2.84 \times 10^{16} u^{57} - 9.16 \times 10^{16} u^{56} + \dots + 9.42 \times 10^{15} a - 9.46 \times 10^{16} \rangle$$

(i) Arc colorings

$$\begin{aligned} a_5 &= \begin{pmatrix} 0 \\ u \end{pmatrix} \\ a_{10} &= \begin{pmatrix} 3.01561u^{57} + 9.72562u^{56} + \dots + 57.2992u + 10.0411 \\ 0.295690u^{57} + 0.202174u^{56} + \dots - 13.3752u - 0.360156 \end{pmatrix} \\ a_2 &= \begin{pmatrix} 1 \\ 0 \end{pmatrix} \\ a_6 &= \begin{pmatrix} 3.31495u^{57} + 10.2517u^{56} + \dots + 41.8810u + 6.27939 \\ 1.40308u^{57} + 4.74267u^{56} + \dots + 14.1209u + 1.31428 \end{pmatrix} \\ a_4 &= \begin{pmatrix} u \\ u \end{pmatrix} \\ a_1 &= \begin{pmatrix} -u^2 + 1 \\ -u^2 \end{pmatrix} \\ a_3 &= \begin{pmatrix} u^4 - u^2 + 1 \\ u^4 \end{pmatrix} \\ a_7 &= \begin{pmatrix} 3.45270u^{57} + 10.0429u^{56} + \dots + 36.6766u + 6.19087 \\ 4.99480u^{57} + 16.8962u^{56} + \dots + 71.0985u + 5.67974 \end{pmatrix} \\ a_9 &= \begin{pmatrix} 3.01561u^{57} + 9.72562u^{56} + \dots + 57.2992u + 10.0411 \\ -1.38901u^{57} - 5.47739u^{56} + \dots - 43.0751u - 2.69698 \end{pmatrix} \\ a_{11} &= \begin{pmatrix} -0.984390u^{57} - 3.27438u^{56} + \dots - 22.7008u - 4.95894 \\ 3.34793u^{57} + 12.0585u^{56} + \dots + 75.4648u + 5.37039 \end{pmatrix} \\ a_8 &= \begin{pmatrix} 0.984390u^{57} + 3.27438u^{56} + \dots + 22.7008u + 4.95894 \\ 2.67819u^{57} + 9.36965u^{56} + \dots + 47.9552u + 3.99489 \end{pmatrix} \\ a_8 &= \begin{pmatrix} 0.984390u^{57} + 3.27438u^{56} + \dots + 22.7008u + 4.95894 \\ 2.67819u^{57} + 9.36965u^{56} + \dots + 47.9552u + 3.99489 \end{pmatrix} \end{aligned}$$

(ii) Obstruction class = -1

(iii) Cusp Shapes

$$= \frac{1606550278673315}{4711714481599631} u^{57} + \frac{5531154945267638}{4711714481599631} u^{56} + \dots + \frac{44269337858367694}{4711714481599631} u - \frac{40813840963650864}{4711714481599631}$$

(iv) Complex Volumes and Cusp Shapes

Solution to I_3^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.232896 - 0.551373I$		
$a = 1.191314 + 0.023058I$	$-11.2723 - 14.6533I$	$-10.80965 + 8.32591I$
$b = 3.17323 - 0.25328I$		
$u = -1.232896 + 0.551373I$		
$a = 1.191314 - 0.023058I$	$-11.2723 + 14.6533I$	$-10.80965 - 8.32591I$
$b = 3.17323 + 0.25328I$		
$u = -1.197641 - 0.519290I$		
$a = -1.036157 + 0.135628I$	$-4.65387 - 10.14069I$	$-8.73196 + 8.19985I$
$b = -3.17838 + 0.13192I$		
$u = -1.197641 + 0.519290I$		
$a = -1.036157 - 0.135628I$	$-4.65387 + 10.14069I$	$-8.73196 - 8.19985I$
$b = -3.17838 - 0.13192I$		
$u = -1.194329 - 0.375553I$		
$a = -1.135619 + 0.718552I$	$-13.34932 - 0.72037I$	$-12.98227 + 3.28415I$
$b = -2.56192 + 0.29434I$		
$u = -1.194329 + 0.375553I$		
$a = -1.135619 - 0.718552I$	$-13.34932 + 0.72037I$	$-12.98227 - 3.28415I$
$b = -2.56192 - 0.29434I$		
$u = -1.194314 - 0.490939I$		
$a = -0.267452 - 1.038563I$	$-7.20694 - 7.37757I$	$-10.28947 + 5.67068I$
$b = -0.538797 - 1.260271I$		
$u = -1.194314 + 0.490939I$		
$a = -0.267452 + 1.038563I$	$-7.20694 + 7.37757I$	$-10.28947 - 5.67068I$
$b = -0.538797 + 1.260271I$		
$u = -1.173328 - 0.465541I$		
$a = 0.969758 - 0.396886I$	$-5.37580 - 4.41103I$	$-10.20284 + 3.41827I$
$b = 2.92285 + 0.04001I$		
$u = -1.173328 + 0.465541I$		
$a = 0.969758 + 0.396886I$	$-5.37580 + 4.41103I$	$-10.20284 - 3.41827I$
$b = 2.92285 - 0.04001I$		

Solution to I_3^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.102792 - 0.531562I$ $a = 0.177602 + 0.507340I$ $b = 0.334880 + 0.621835I$	$-0.69171 - 6.13139I$	$-1.89157 + 6.52197I$
$u = -1.102792 + 0.531562I$ $a = 0.177602 - 0.507340I$ $b = 0.334880 - 0.621835I$	$-0.69171 + 6.13139I$	$-1.89157 - 6.52197I$
$u = -0.989582 - 0.681314I$ $a = 0.913811 - 0.272536I$ $b = 1.145487 - 0.652819I$	$-2.57248 - 7.45358I$	$-8.30714 + 7.17302I$
$u = -0.989582 + 0.681314I$ $a = 0.913811 + 0.272536I$ $b = 1.145487 + 0.652819I$	$-2.57248 + 7.45358I$	$-8.30714 - 7.17302I$
$u = -0.876500 - 0.566132I$ $a = -0.956835 - 0.051894I$ $b = -1.42795 + 0.12456I$	$2.08472 - 4.56768I$	$-1.81782 + 7.20311I$
$u = -0.876500 + 0.566132I$ $a = -0.956835 + 0.051894I$ $b = -1.42795 - 0.12456I$	$2.08472 + 4.56768I$	$-1.81782 - 7.20311I$
$u = -0.870407$ $a = -1.94634$ $b = -2.21434$	-10.2057	4.64730
$u = -0.844388 - 0.455991I$ $a = 0.157109 - 1.054390I$ $b = 0.439546 + 0.311722I$	$-1.05945 - 3.12017I$	$-5.50127 + 4.47326I$
$u = -0.844388 + 0.455991I$ $a = 0.157109 + 1.054390I$ $b = 0.439546 - 0.311722I$	$-1.05945 + 3.12017I$	$-5.50127 - 4.47326I$
$u = -0.711409 - 0.407289I$ $a = 1.175998 + 0.016113I$ $b = 1.75724 + 0.23127I$	$-0.629418 - 0.623631I$	$-5.36343 + 3.54196I$

Solution to I_3^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.711409 + 0.407289I$ $a = 1.175998 - 0.016113I$ $b = 1.75724 - 0.23127I$	$-0.629418 + 0.623631I$	$-5.36343 - 3.54196I$
$u = -0.638300 - 0.592248I$ $a = -0.012372 + 0.960639I$ $b = 0.0336808 + 0.0333848I$	$2.76529 - 0.01343I$	$1.057430 - 0.032902I$
$u = -0.638300 + 0.592248I$ $a = -0.012372 - 0.960639I$ $b = 0.0336808 - 0.0333848I$	$2.76529 + 0.01343I$	$1.057430 + 0.032902I$
$u = -0.573182 - 0.818987I$ $a = 0.454202 - 0.976673I$ $b = -0.060919 - 0.315107I$	$-1.33556 + 1.90763I$	$-7.20457 - 1.48336I$
$u = -0.573182 + 0.818987I$ $a = 0.454202 + 0.976673I$ $b = -0.060919 + 0.315107I$	$-1.33556 - 1.90763I$	$-7.20457 + 1.48336I$
$u = -0.318010 - 0.669454I$ $a = -0.835222 - 0.119144I$ $b = -0.204987 - 0.054879I$	$1.56893 + 1.49125I$	$1.52605 - 1.85258I$
$u = -0.318010 + 0.669454I$ $a = -0.835222 + 0.119144I$ $b = -0.204987 + 0.054879I$	$1.56893 - 1.49125I$	$1.52605 + 1.85258I$
$u = -0.163994 - 0.921606I$ $a = -0.38814 - 1.60154I$ $b = -0.359654 + 0.512136I$	$-8.03060 + 9.32855I$	$-7.95440 - 5.34516I$
$u = -0.163994 + 0.921606I$ $a = -0.38814 + 1.60154I$ $b = -0.359654 - 0.512136I$	$-8.03060 - 9.32855I$	$-7.95440 + 5.34516I$
$u = -0.149661 - 0.820870I$ $a = 0.15413 + 1.48993I$ $b = 0.077737 - 0.785361I$	$-1.54879 + 5.22529I$	$-5.49197 - 5.46614I$

Solution to I_3^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.149661 + 0.820870I$ $a = 0.15413 - 1.48993I$ $b = 0.077737 + 0.785361I$	$-1.54879 - 5.22529I$	$-5.49197 + 5.46614I$
$u = -0.106334$ $a = 5.36182$ $b = 0.762327$	-1.11333	-8.96695
$u = -0.091411 - 0.780425I$ $a = 1.57026 - 0.01002I$ $b = 0.545497 + 0.173834I$	$-3.98695 + 2.71614I$	$-7.03008 - 2.60179I$
$u = -0.091411 + 0.780425I$ $a = 1.57026 + 0.01002I$ $b = 0.545497 - 0.173834I$	$-3.98695 - 2.71614I$	$-7.03008 + 2.60179I$
$u = -0.037554 - 0.696936I$ $a = 0.17786 - 1.62233I$ $b = 0.438391 + 0.736708I$	$-2.18920 + 0.10128I$	$-7.14023 + 0.24730I$
$u = -0.037554 + 0.696936I$ $a = 0.17786 + 1.62233I$ $b = 0.438391 - 0.736708I$	$-2.18920 - 0.10128I$	$-7.14023 - 0.24730I$
$u = 0.160069 - 0.784365I$ $a = -0.18638 + 1.89429I$ $b = -0.638001 - 0.338647I$	$-9.34785 - 3.11893I$	$-9.46209 + 0.65327I$
$u = 0.160069 + 0.784365I$ $a = -0.18638 - 1.89429I$ $b = -0.638001 + 0.338647I$	$-9.34785 + 3.11893I$	$-9.46209 - 0.65327I$
$u = 0.755123 - 0.252808I$ $a = -0.806647 + 0.086757I$ $b = -0.293637 - 1.085070I$	$-1.14303 + 1.20148I$	$-5.78859 - 5.55533I$
$u = 0.755123 + 0.252808I$ $a = -0.806647 - 0.086757I$ $b = -0.293637 + 1.085070I$	$-1.14303 - 1.20148I$	$-5.78859 + 5.55533I$

Solution to I_3^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.784274 - 0.573350I$ $a = 1.083998 + 0.658643I$ $b = 0.208953 + 1.259873I$	$-6.51259 + 2.28009I$	$-10.96046 - 3.19134I$
$u = 0.784274 + 0.573350I$ $a = 1.083998 - 0.658643I$ $b = 0.208953 - 1.259873I$	$-6.51259 - 2.28009I$	$-10.96046 + 3.19134I$
$u = 0.926447 - 0.125757I$ $a = 0.199327 + 0.446703I$ $b = 0.61663 - 2.78731I$	$-3.24157 + 0.49714I$	$-10.0374 + 15.0443I$
$u = 0.926447 + 0.125757I$ $a = 0.199327 - 0.446703I$ $b = 0.61663 + 2.78731I$	$-3.24157 - 0.49714I$	$-10.0374 - 15.0443I$
$u = 1.061185 - 0.329222I$ $a = 0.072871 - 0.438850I$ $b = 0.593523 - 0.500009I$	$-2.16889 + 1.07216I$	$-4.64986 - 0.67610I$
$u = 1.061185 + 0.329222I$ $a = 0.072871 + 0.438850I$ $b = 0.593523 + 0.500009I$	$-2.16889 - 1.07216I$	$-4.64986 + 0.67610I$
$u = 1.09673$ $a = 0.500310$ $b = 1.88968$	-2.28699	3.94785
$u = 1.173675 - 0.441088I$ $a = -0.976629 - 0.150330I$ $b = -3.14419 - 0.62683I$	$-5.55187 + 4.00580I$	$-10.40862 - 4.06457I$
$u = 1.173675 + 0.441088I$ $a = -0.976629 + 0.150330I$ $b = -3.14419 + 0.62683I$	$-5.55187 - 4.00580I$	$-10.40862 + 4.06457I$
$u = 1.185228 - 0.515535I$ $a = 1.209413 + 0.042403I$ $b = 3.07922 + 0.81594I$	$-12.3578 + 7.9362I$	$-12.05500 - 4.43772I$

Solution to I_3^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.185228 + 0.515535I$ $a = 1.209413 - 0.042403I$ $b = 3.07922 - 0.81594I$	$-12.3578 - 7.9362I$	$-12.05500 + 4.43772I$
$u = 1.203611 - 0.410456I$ $a = -0.289876 + 0.945812I$ $b = -1.09131 + 1.07260I$	$-7.78075 + 1.40297I$	$-11.36161 - 0.62111I$
$u = 1.203611 + 0.410456I$ $a = -0.289876 - 0.945812I$ $b = -1.09131 - 1.07260I$	$-7.78075 - 1.40297I$	$-11.36161 + 0.62111I$
$u = 1.220351 - 0.368821I$ $a = 0.860274 + 0.408376I$ $b = 2.84061 + 0.31923I$	$-5.71379 - 1.22939I$	$-10.76366 + 2.88408I$
$u = 1.220351 + 0.368821I$ $a = 0.860274 - 0.408376I$ $b = 2.84061 - 0.31923I$	$-5.71379 + 1.22939I$	$-10.76366 - 2.88408I$
$u = 1.302724 - 0.354277I$ $a = -0.949730 - 0.662491I$ $b = -2.44022 - 0.55485I$	$-12.71920 - 4.94560I$	$-12.13992 + 3.22050I$
$u = 1.302724 + 0.354277I$ $a = -0.949730 + 0.662491I$ $b = -2.44022 + 0.55485I$	$-12.71920 + 4.94560I$	$-12.13992 - 3.22050I$
$u = 1.31323$ $a = -0.969547$ $b = -1.97267$	-8.12166	-10.1036

IV. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1	$(u-1)^2(u^6 + u^5 + \dots + u + 1)(u^{58} + 4u^{57} + \dots + 14u + 1)$
c_2	$(u+1)^2(u^6 + 3u^5 + 5u^4 + 4u^3 + 2u^2 + u + 1)$ $(u^{58} + 32u^{57} + \dots + 94u + 1)$
c_3	$u^2(u^6 - u^5 + \dots - u + 1)(u^{58} + 2u^{57} + \dots - 20u + 4)$
c_4	$(u+1)^2(u^6 - u^5 + \dots - u + 1)(u^{58} + 4u^{57} + \dots + 14u + 1)$
c_5	$u^6(u^2 + u - 1)(u^{58} + 2u^{57} + \dots + 128u + 64)$
c_6	$u^2(u^6 + u^5 + \dots + u + 1)(u^{58} + 2u^{57} + \dots - 20u + 4)$
c_7	$u^2(u^6 - 3u^5 + \dots - u + 1)(u^{58} + 18u^{57} + \dots + 360u + 16)$
c_8	$(u-1)^6(u^2 + u - 1)(u^{58} + 8u^{57} + \dots + 4u + 1)$
c_9	$u^6(u^2 - u - 1)(u^{58} + 2u^{57} + \dots + 128u + 64)$
c_{10}, c_{11}	$(u+1)^6(u^2 - u - 1)(u^{58} + 8u^{57} + \dots + 4u + 1)$

V. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_4	$(y-1)^2(y^6 - 3y^5 + 5y^4 - 4y^3 + 2y^2 - y + 1)$ $(y^{58} - 32y^{57} + \dots - 94y + 1)$
c_2	$(y-1)^2(y^6 + y^5 + \dots + 3y + 1)(y^{58} - 8y^{57} + \dots - 7838y + 1)$
c_3, c_6	$y^2(y^6 - 3y^5 + \dots - y + 1)(y^{58} - 18y^{57} + \dots - 360y + 16)$
c_5, c_9	$y^6(y^2 - 3y + 1)(y^{58} - 42y^{57} + \dots - 8192y + 4096)$
c_7	$y^2(y^6 + y^5 + \dots + 3y + 1)(y^{58} + 42y^{57} + \dots - 33056y + 256)$
c_8, c_{10}, c_{11}	$(y-1)^6(y^2 - 3y + 1)(y^{58} - 60y^{57} + \dots - 36y + 1)$