

Shawn Ault

<http://www.math.ohio-state.edu/~ault/>

vault/Programs/

GAP

KnotTheory.g }  
}

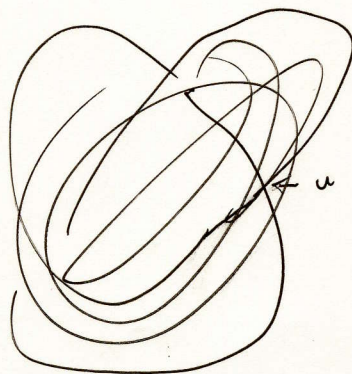
Kauffman Bracket

Jones Polynomial

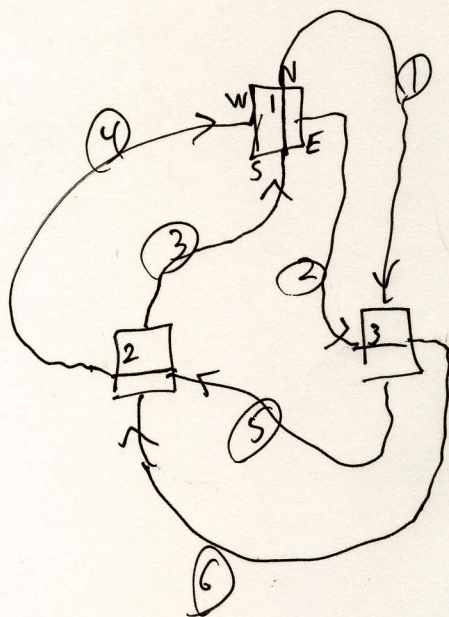
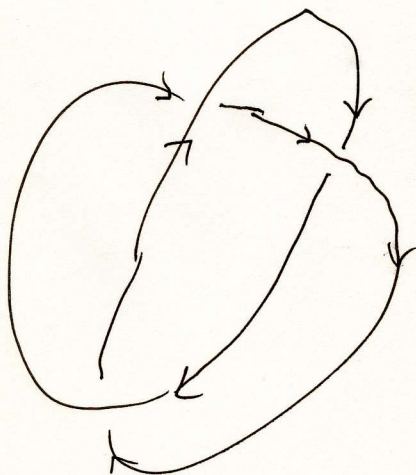
RibGraph.g }  
}

RibbonGraph

Bollobas Riordan Poly







$$C := \begin{bmatrix} [1, -2, 3, -4], \\ [-3, 5, -6, 4], \\ [-1, 6, -5, 2] \end{bmatrix}$$

$$O_r := \begin{bmatrix} [1, 1, -1, -1], \\ [1, -1, -1, 1], \\ [-1, 1, 1, -1] \end{bmatrix}$$

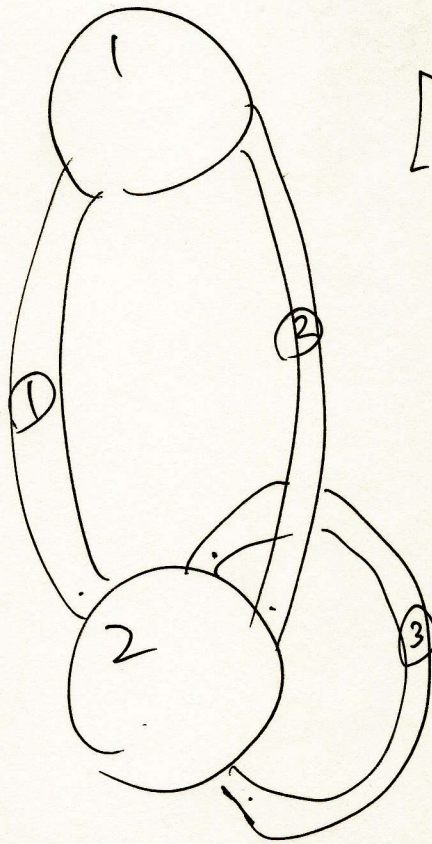
$\langle K \rangle$  -----

$$A,$$

$$B = 1/A$$

$$d = -A^2 - A^{-2}$$

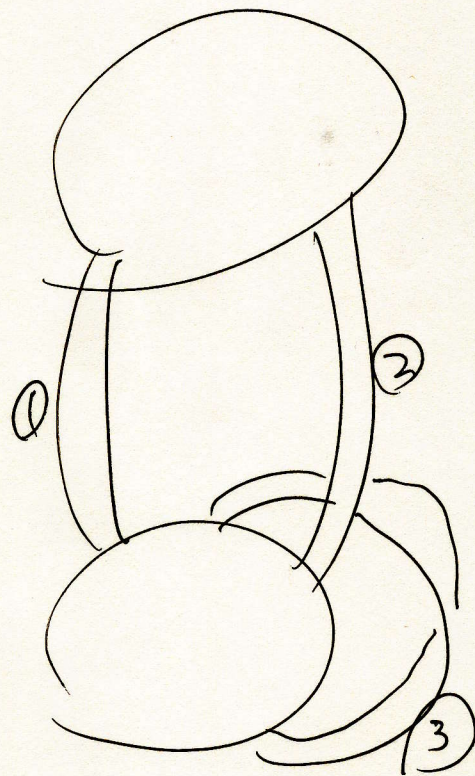




[ [ 1, 2 ],  
[ 3, 2, 3, 1 ] ]

$$y^2 z^2 + xy + x + 3y + 2$$



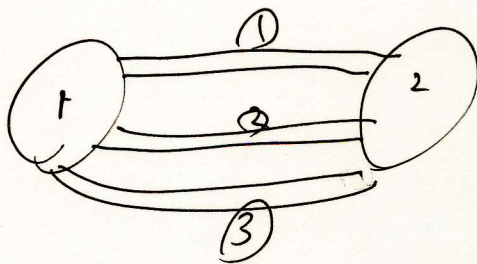
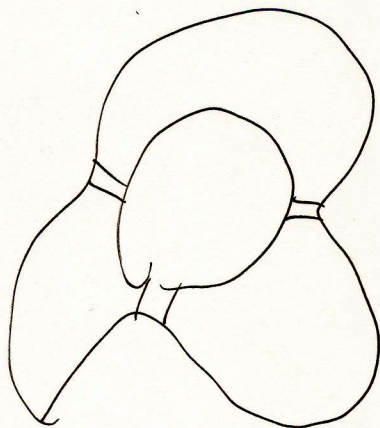
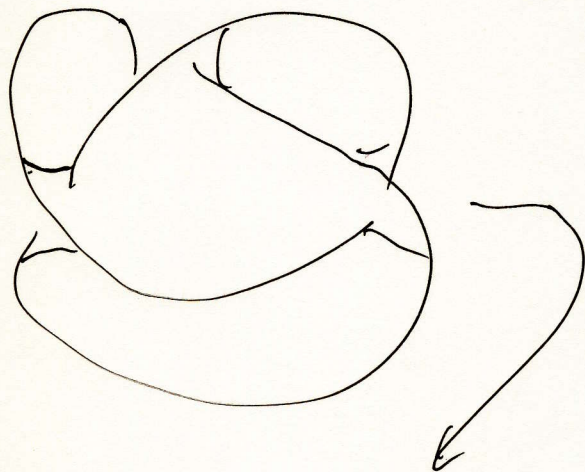


$$y^2 z^2 + xyz + 2yz + x + y + z$$



Trefoil

$$A^7 - A^3 - A^{-5}$$





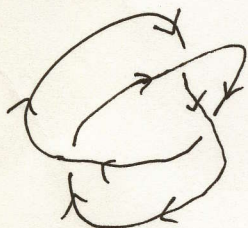
GAP

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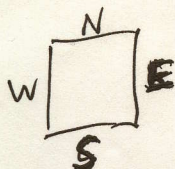
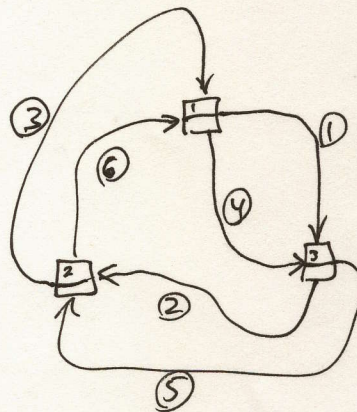
KnotTheory.g { Kauffman Bracket  
Jones Polynomial

RibGraph.g { Ribbon Graph  
Bollobas Riordan Poly

Trefoil:



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C := [[-3, 1, -4, 6], [-6, 2, -5, 3], [-1, 5, -2, 4]];

Or := [[-1, 1, 1, -1], [1, -1, -1, 1], [-1, 1, 1, -1]];

K := KauffmanBracket(C);

rec(poly :=  $A^7 - A^3 - A^{-5}$ , var := A)

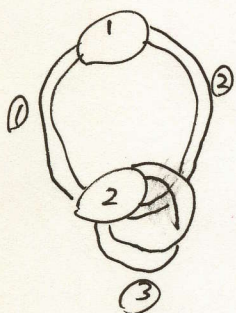
J := JonesPolynomial(C, Or);

rec(poly :=  $(q^3 + q - 1)/q^4$ , var := q)

Value(J.poly, 2);

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Ribbon Graphs:



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G := RibbonGraph([[1, 2], [-3, 2, -3, 1]]);

R := BollobasRiordanPoly(G);

rec(poly :=  $y^2z^2 + xyz + 2yz + x + y + z$ , vars := [x, y, z]);

Favorite Ribbon Graph?

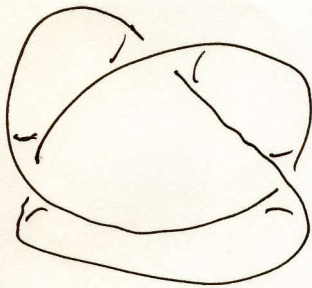


For an alternating virtual link diagram,  $L$ , and corresponding ribbon graph,  $G$ ,

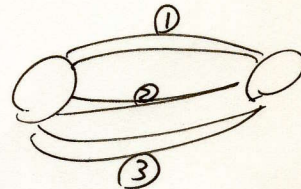
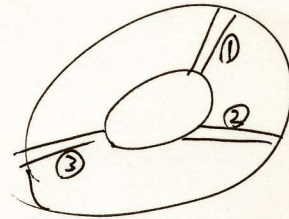
$$[L](A, B, d) = A^{r(G)} B^{n(G)} d^{k(G)-1} R_G\left(\frac{Bd}{A}, \frac{Ad}{B}, \frac{1}{d}\right)$$

[Chmutov, Pak]

Trefoil: Kauffman Bracket(C);  $A^7 - A^3 - A^{-5}$



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[[1,2,3], [3,2,1]]

$$G := \text{RibbonGraph}([ [1,2,3], [3,2,1] ]);$$

$$R := \text{BollobasRiordanPoly}(G);$$

$$r := G.r; \quad n := G.n; \quad k := G.k;$$

$$B := 1/A; \quad d := -A^2 - A^{-2};$$

$$F := \text{Value}(R.poly, R.vars, [B*d/A, A*d/B, 1/d]);$$

$$A^r * B^n * d^{k-1} * F;$$

$$A^7 - A^3 - A^{-5}$$