

17-1350-AKT Tue Jan 17, Gentle Hours 3-4: Tangles and a better Jones Program

January 8, 2017 9:12 AM

Pass email contact sheet; no HW unless demanded.

Bring coffee cups for Seifert demo!

Kauffman classic:

$$\left(\begin{array}{c} \diagup \\ \diagdown \end{array} \right) = A \left(\begin{array}{c} \diagup \\ \diagup \end{array} \right) + B \left(\begin{array}{c} \diagdown \\ \diagdown \end{array} \right) \quad \bigcirc = d$$

"0-smoothing" "1-smoothing"

$$\left(\begin{array}{c} 1 \\ \diagdown \\ 2 \end{array} \right) = A^2 \left(\begin{array}{c} \bigcirc \\ \diagdown \end{array} \right) + AB \left(\begin{array}{c} \bigcirc \\ \diagup \end{array} \right) + BA \left(\begin{array}{c} \bigcirc \\ \diagdown \end{array} \right) + B^2 \left(\begin{array}{c} \bigcirc \\ \diagup \end{array} \right)$$

$$\Rightarrow AB=1, \quad ABd + A^2 + B^2 = 0 \quad \text{so } d = -\frac{1}{A^2} - \frac{1}{B^2}$$

R3 works, but

$$\left(\begin{array}{c} \uparrow \\ \bigcirc \end{array} \right) \rightarrow A \left(\begin{array}{c} \bigcirc \\ \bigcirc \end{array} \right) + A^{-1} \left(\begin{array}{c} \bigcirc \\ \bigcirc \end{array} \right) = -A^3 \left(\begin{array}{c} \bigcirc \\ \bigcirc \end{array} \right)$$

so better set $J(D) = \langle D \rangle (-A^3)^{-w(K)}$... leads back to our formulas.

Then continue w/ 170117-MoreJones.nb :

- * Review
- * Program
- * Tangles & testing R-moves.
- * Vincent's diagram (look up 84 in knot atlas!)
- * The faster Jones program & the race, also as in 170117-FastSlowRace.nb,

Note: $\text{rank}_{\mathbb{Z}[A]} L_n = \left\{ \left(\begin{array}{c} \bigcirc \\ \bigcirc \end{array} \right) / \bigcirc = d \right\} = C_n = \text{the } n\text{th Catalan number} = \frac{1}{n+1} \binom{2n}{n} \sim 4^n$

"Temperley-Lieb algebra" (2n ends)

If time: Seifert surfaces, knot genus, tangle formulation. Jones link.