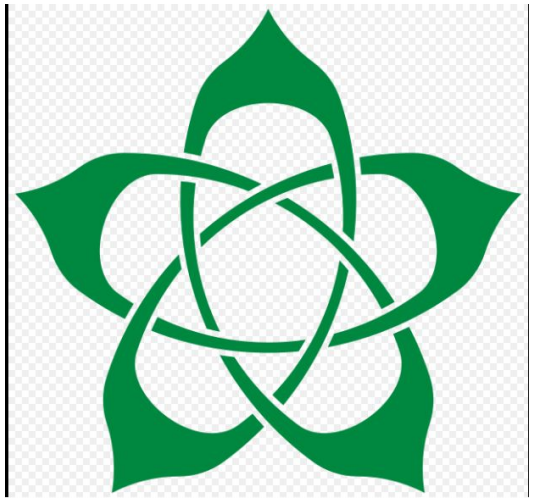
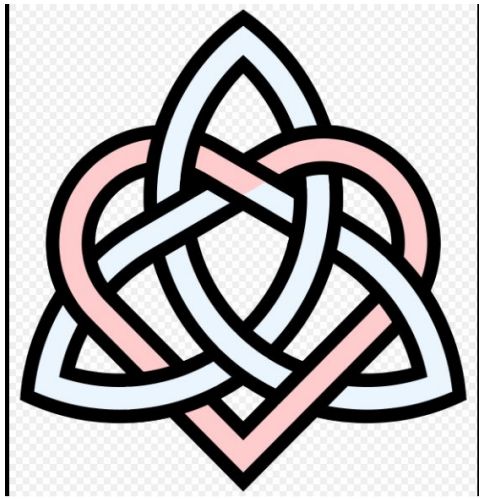
Knuts about Knitting Knots

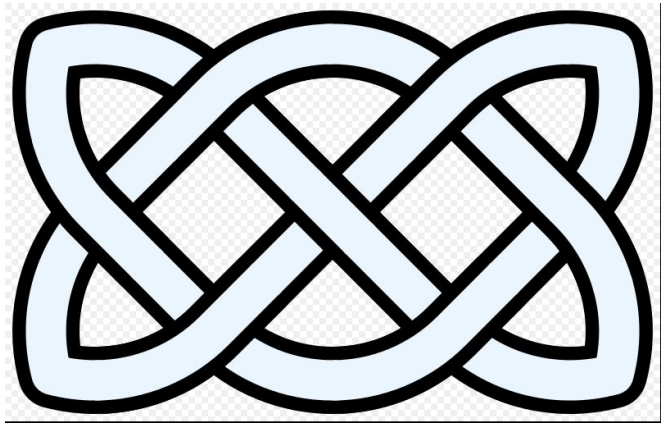
by

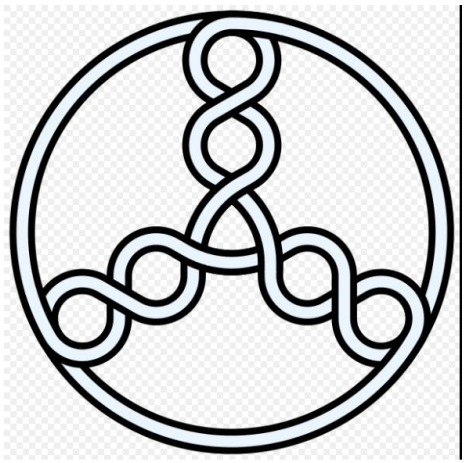
Elizabeth Chesney

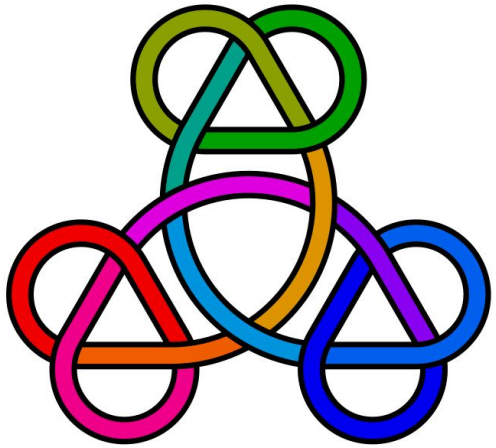
Inspiration



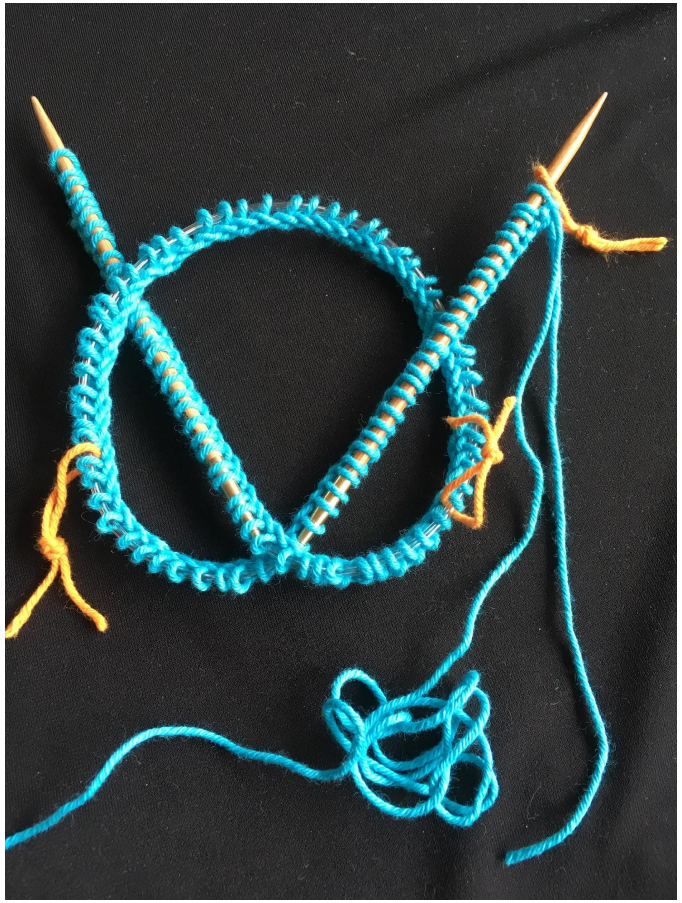




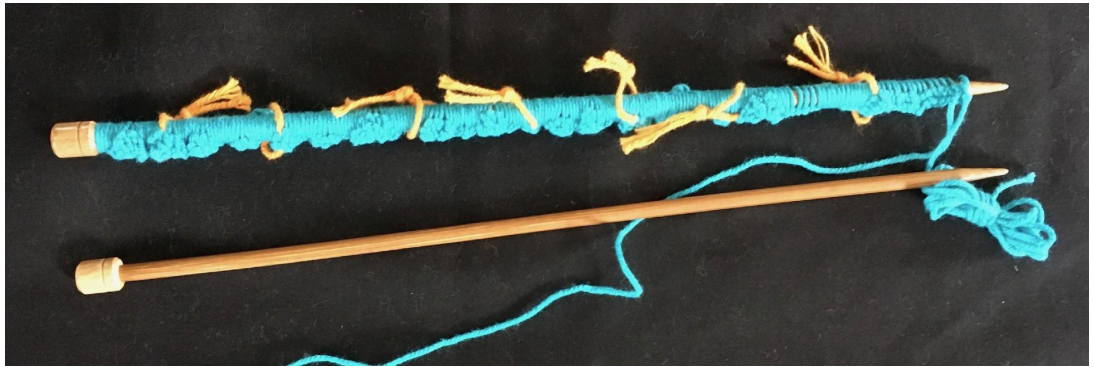


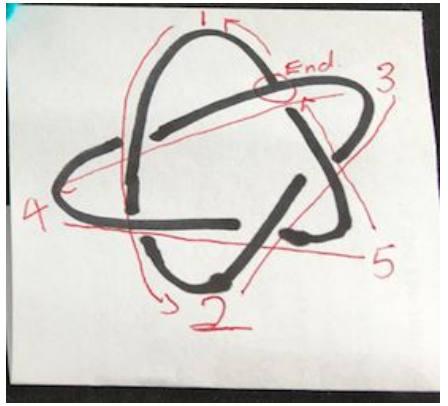


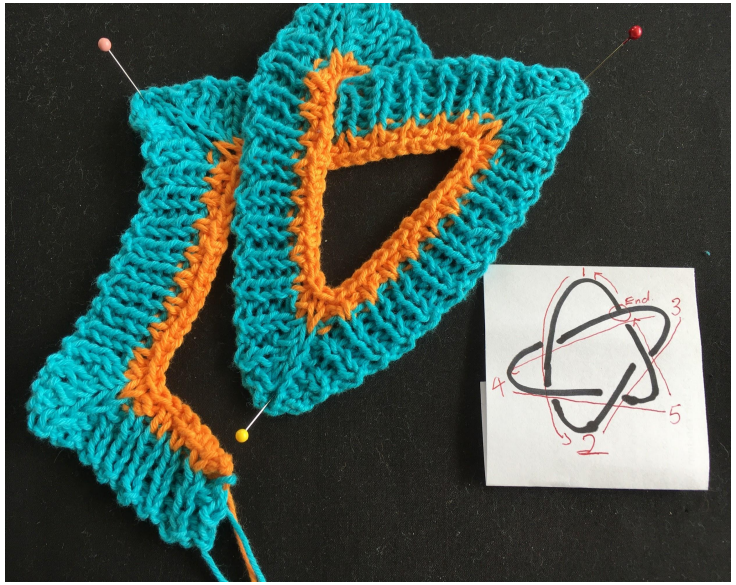
Knitting Knots the Hard Way

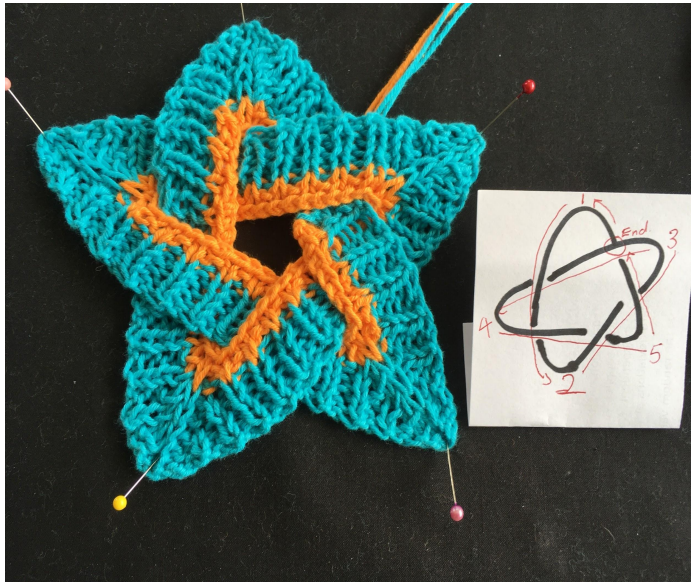


Knitting Knots an Easier Way

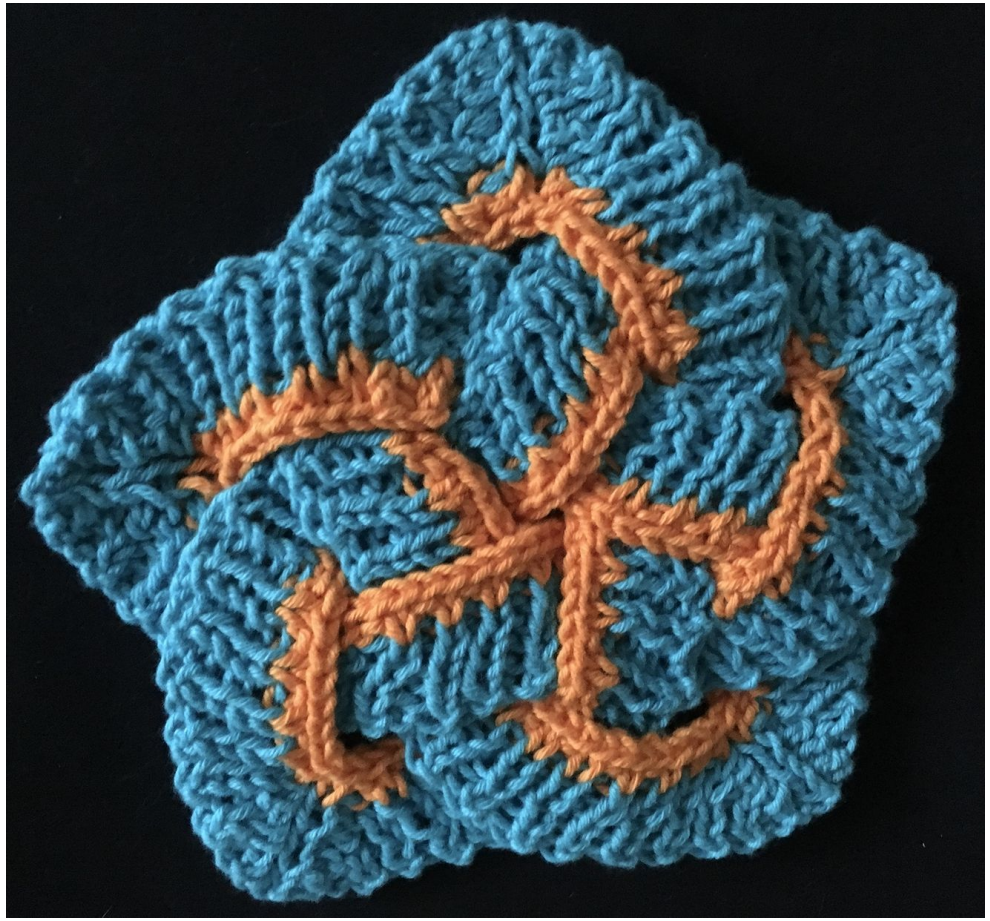


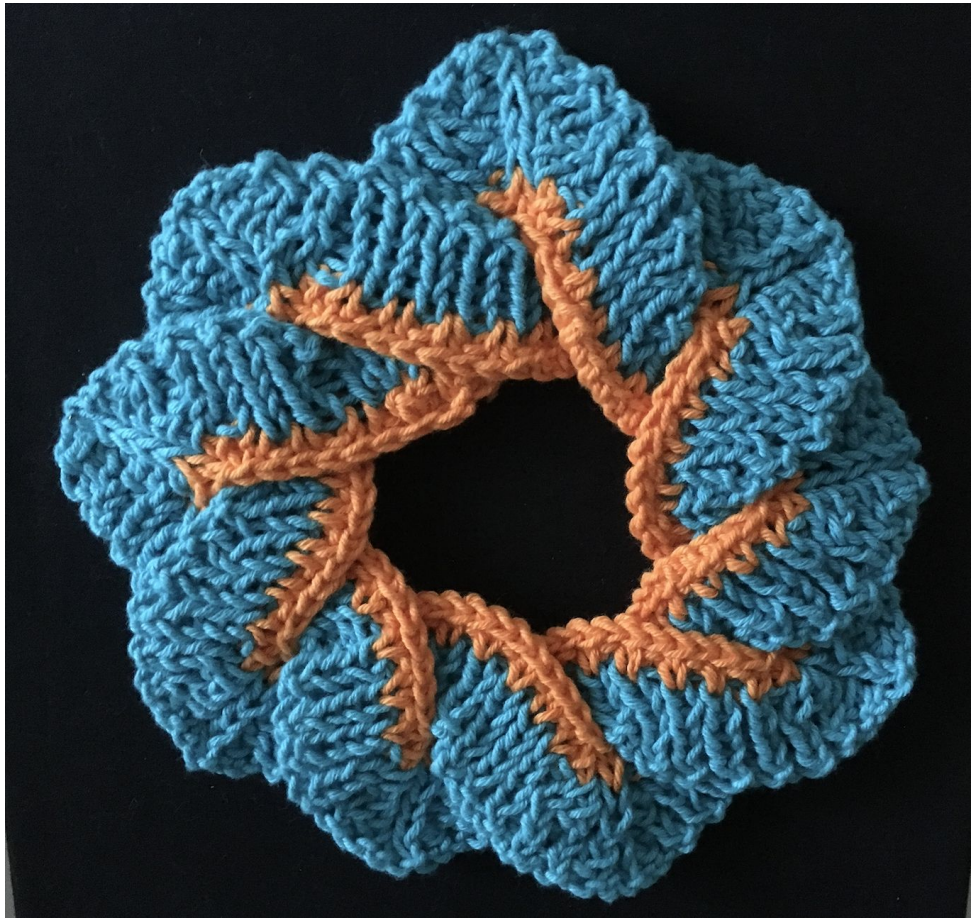






More Knots knitted in this way

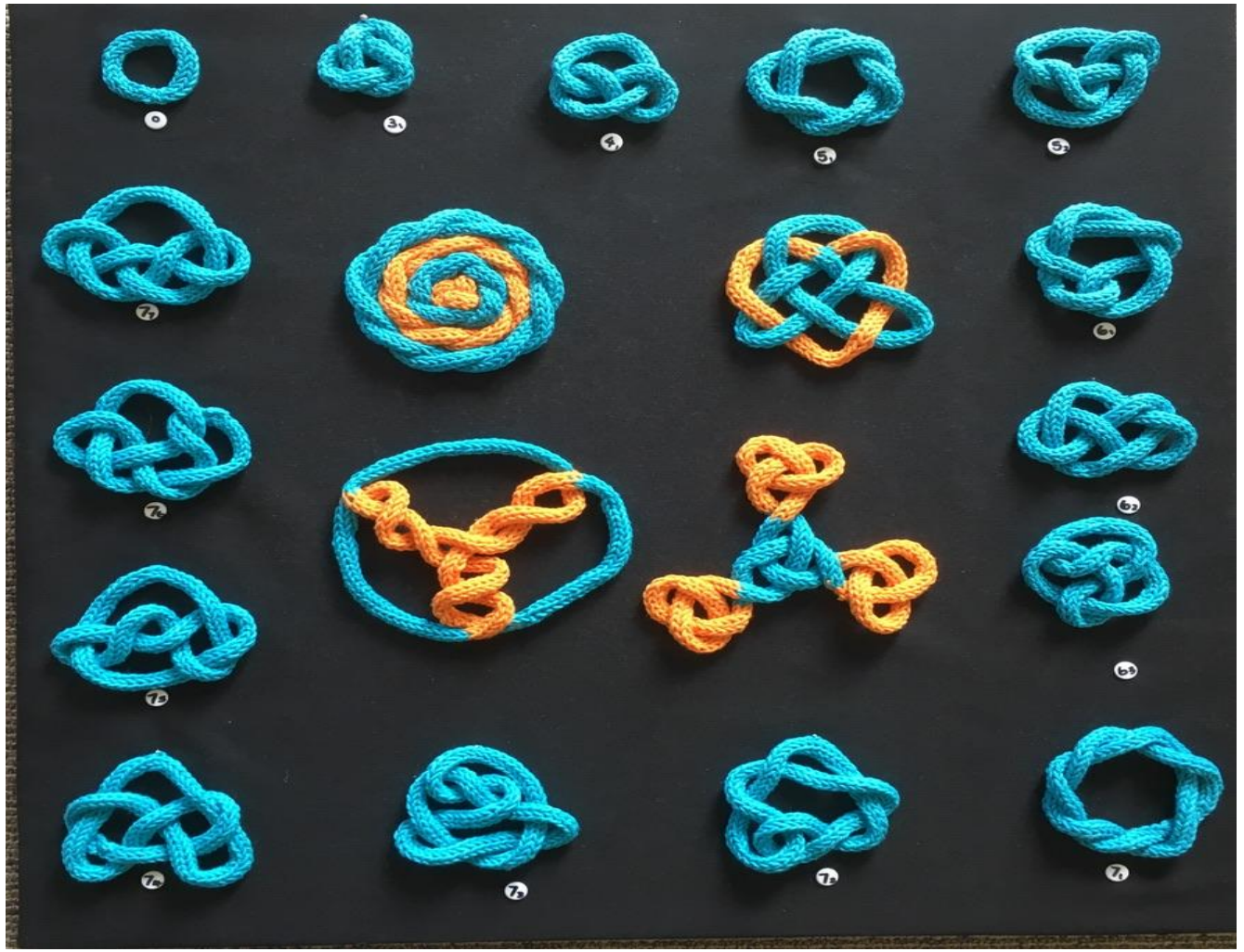




Knitting Knots Another Way

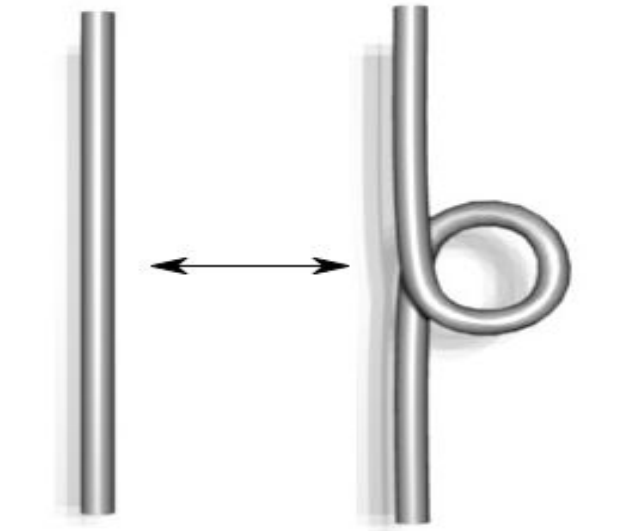
Some Mathematical Concepts

- Classification & Crossing Number

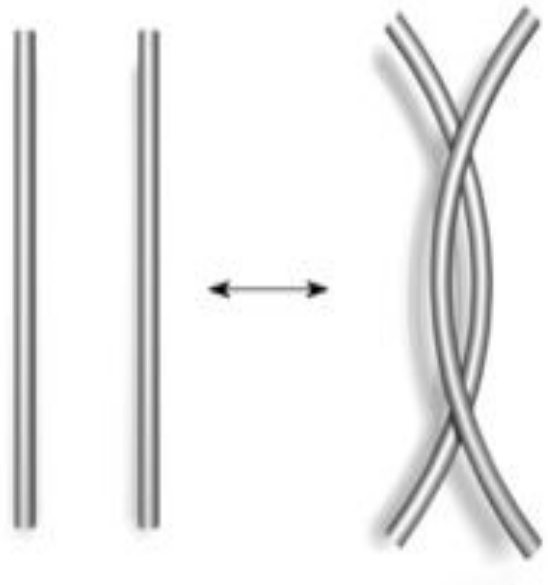


Some Mathematical Concepts

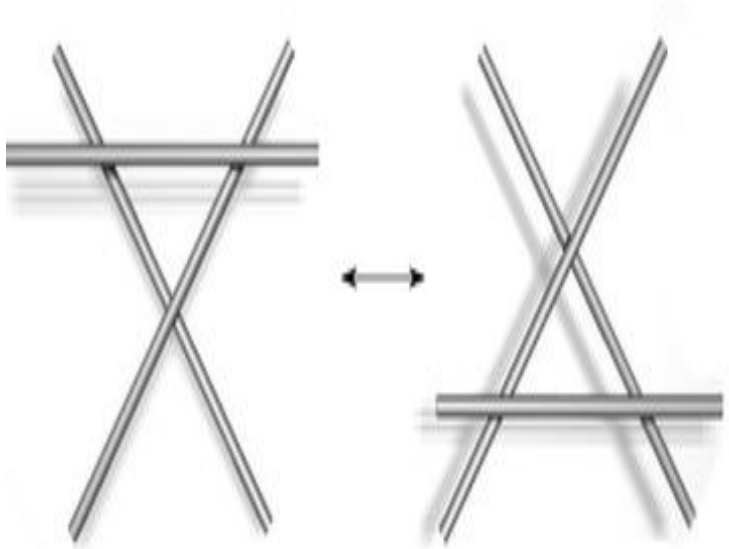
- Classification & Crossing Number
- Equivalence & Reidermeister Moves



Type I, the Twist

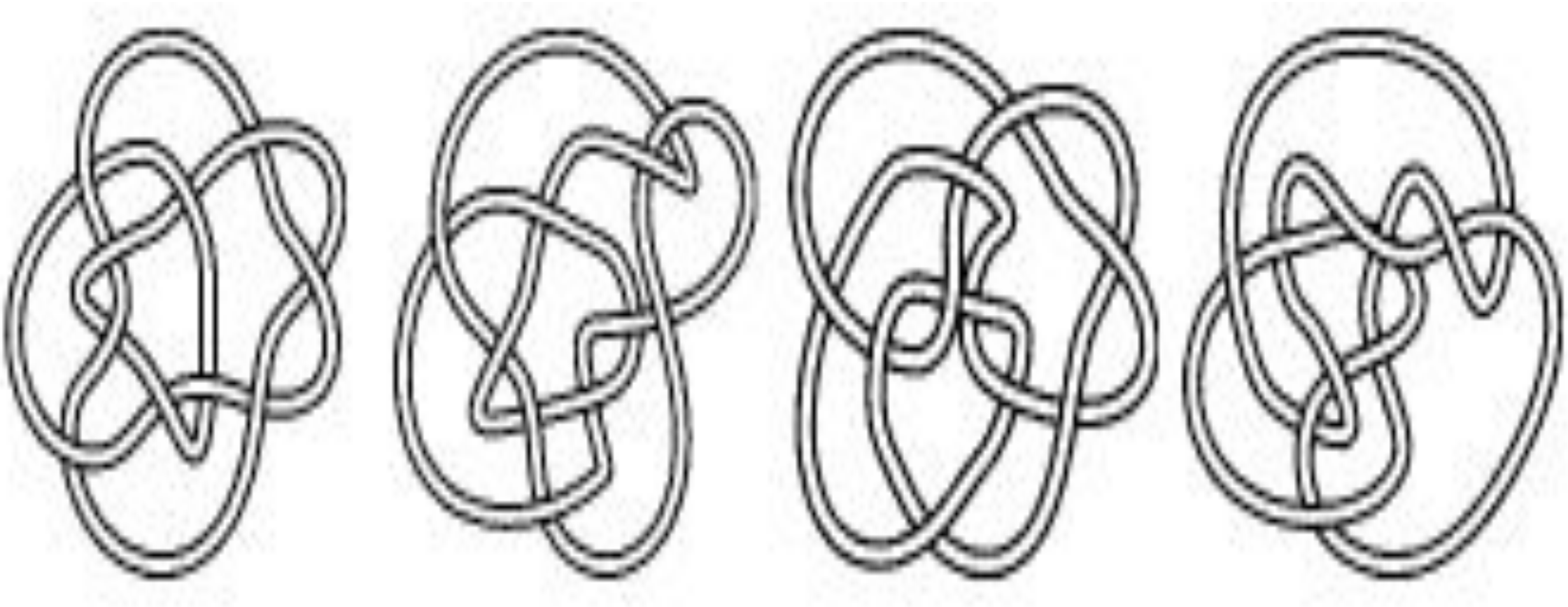


Type II, the Poke

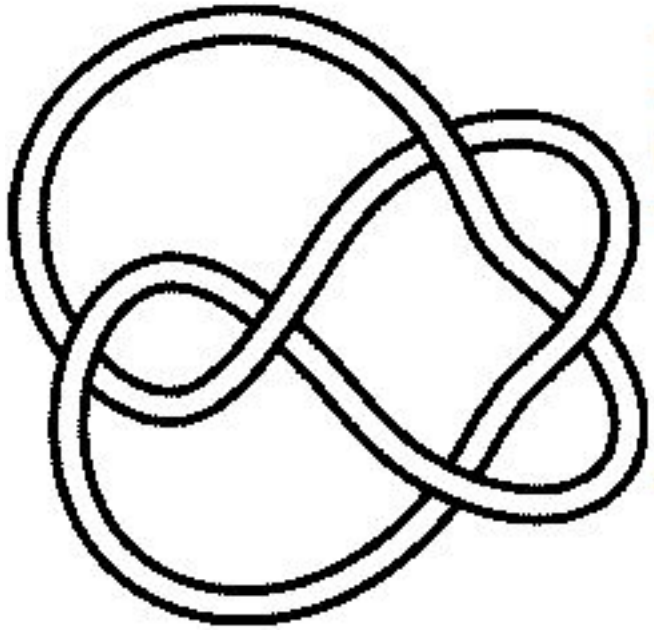


Type III, the Slide.

Spot the Difference!!!



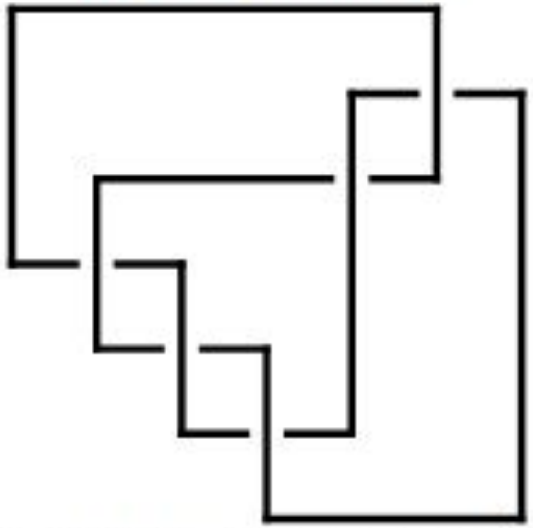
Ways to define and distinguish knots



Jones polynomial $-q^{-6} + q^{-5} - q^{-4} + 2q^{-3} - q^{-2} + q^{-1}$

Alexander polynomial $2t + 2t^{-1} - 3$

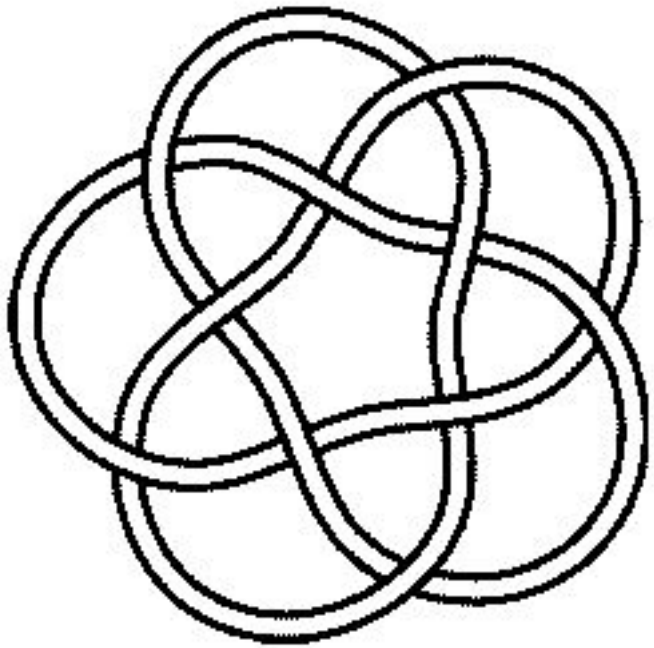
An Arc Presentation



[{7, 4}, {3, 5}, {4, 2}, {1, 3}, {2, 6}, {5, 7}, {6, 1}]

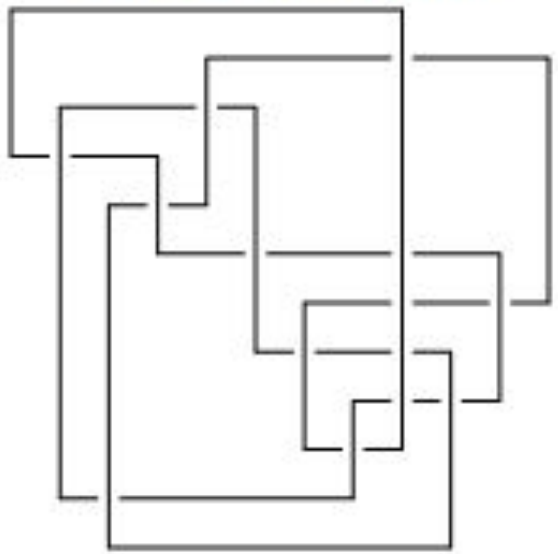
Knot 5_2

Jones polynomial $-q^5 + 5q^4 - 10q^3 + 15q^2 - 19q + 21 - 19q^{-1} + 15q^{-2} - 10q^{-3} + 5q^{-4} - q^{-5}$



Knot 10_{123}

An Arc Presentation



[{3, 10}, {2, 8}, {9, 7}, {8, 11}, {10, 6}, {7, 12}, {11, 4}, {5, 3}, {4, 1}, {6, 2}, {12, 5}, {1, 9}]

Alexander polynomial $t^4 - 6t^3 + 15t^2 - 24t + 29 - 24t^{-1} + 15t^{-2} - 6t^{-3} + t^{-4}$

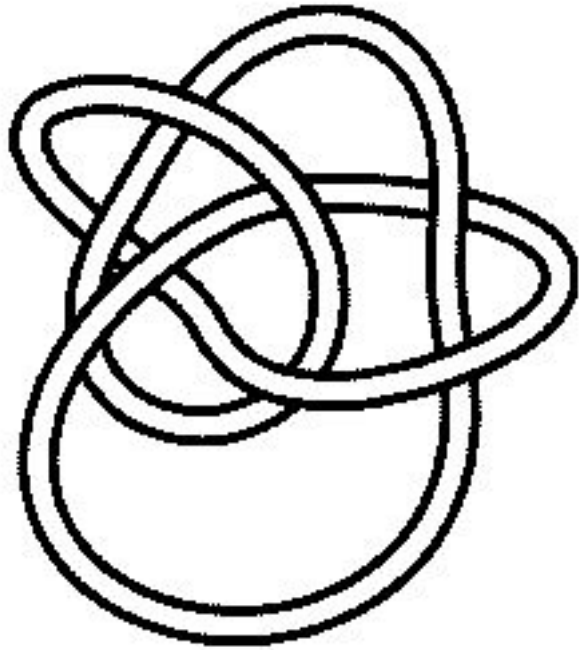
Some Mathematical Concepts

- Classification and Crossing Number
- Equivalence & Reidermeister Moves
- Prime & Composite




Some Mathematical Concepts

- Classification & Crossing Number
- Equivalence & Reidermeister Moves
- Prime & Composite
- Alternating Knots




Dunfallandy, Perthshire.

Some Mathematical Concepts

- Classification & Crossing Number
- Equivalence & Reidermeister Moves
- Prime & Composite
- Alternating Knots
- Unknotting Number

Some Mathematical Concepts

- Classification & Crossing Number
- Equivalence & Reidermeister Moves
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- Alternating Knots
- Unknotting Number
- **Amphichirality**

Areas using Knot Theory

- **Art & Craft:** has been used for hundreds of years
- **Chemistry:** molecules and compounds exhibiting knot formations and behaviour
- **Medicine:** Drugs with knot characteristics – most famous is thalidemide
- **Genetics:** enzymes that knot and unknot our DNA
- **Quantum Physics & Statistical Mechanics**

What inspires YOU?

Knot Knitting anyone?