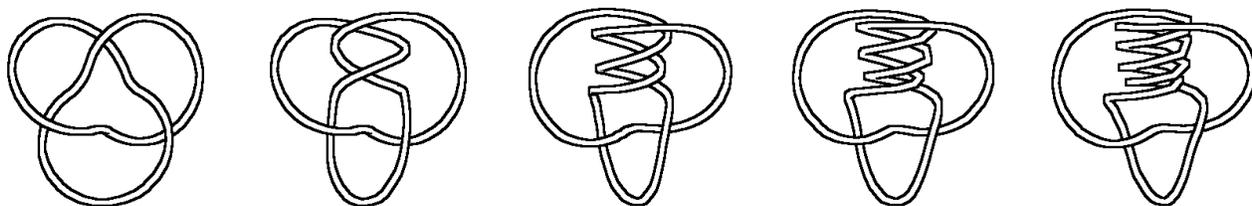
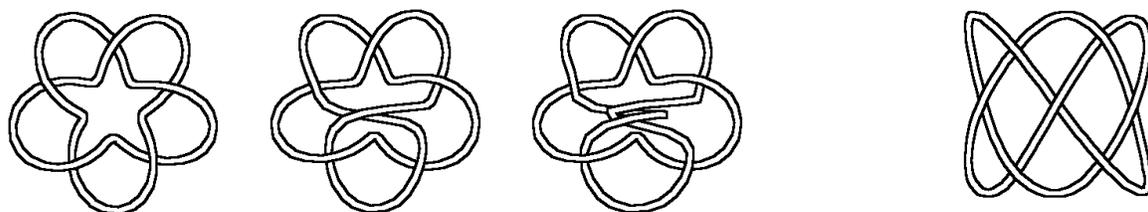


Morph Through Five Prime Knots *

A prime knot is a knot that cannot be written as the knot sum of smaller knots. For example, the Square Knot and the Granny Knot are not prime since each is a sum of two Trefoil Knots. There are 14 prime knots with at most 7 minimal number of crossings. They have been hand drawn so often that they have assumed an esthetically defined standard shape. Of these first 14 prime knots the following ones are in a morphing family, the prime knots $3_1, 4_1, 5_2, 6_1, 7_2$. Choose $dd = 3$ and $0 \leq ff \leq 4.3$ in Set Morphing and the program will deform the Trefoil Knot through the following images:



If one chooses $dd = 5$ and $0 \leq ff \leq 2.3$ in Set Morphing then the program will deform the (5,2)-Torus Knot through the following images of the prime knots $5_1, 6_2, 7_5$:



The prime knot 7_4 is the default Lissajous space curve.

*This file is from the 3D-XploreMath project.
Please see <http://www.math.uci.edu/~palais/> or <http://3d-xplormath.org/>

There are 249 prime knots with at most 10 minimal number of crossings. One can visualize those via the Space Curves Menu entry: “V. Jones Braid List”. The notion of prime knot is important because Horst Schubert proved that the decomposition of a knot as knot sum (= connected sum) of prime knots is unique. The knot invariants are a good way to check whether a given knot is a prime knot.

There is an easy sufficient criterion that guarantees that the knot under consideration cannot be drawn with fewer crossings: The thread of the knot has to pass alternatingly through overcrossings and undercrossings. Such knots are called alternating knots.

H.K.