

# Homework Assignment 9

Due: Thursday December 3, 2020 11:59 PM (Eastern Standard Time)

## Assignment description

See also <http://drorbn.net/20-1350/HW09.pdf>.

## Submit your assignment

[Help](#)

After you have completed the assignment, please save, scan, or take photos of your work and upload your files to the questions below. Crowdmark accepts PDF, JPG, and PNG file formats.

### Q1 (10 points)

Prove that a non-trivial torus knot is prime by considering how a 2-sphere exhibiting a decomposition would cut the torus carrying the knot.

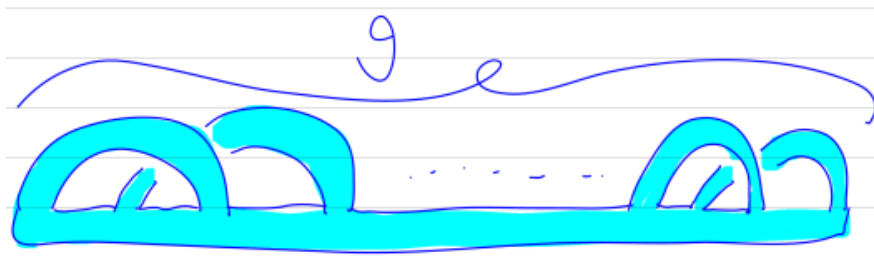
### Q2 (10 points)

The "intersection number" of a smooth oriented curve and a smooth oriented surface in  $\mathbb{R}^3$  is the number of intersections between the two, counted with signs (you should figure out what is the sign rule!)

Show that the linking number of a two-component link is the intersection number of one component with a Seifert surface for the other.

### Q3 (10 points)

(a) Show that every knot can be presented as the boundary of an embedding of a "caravan of  $g$  thick double-hump camels":



(b) Deduce that modulo the additional relation below, every knot can be reduced to a (possibly empty) connected sum of trefoil knots.

