

## Math 410: Knot Theory

### Reading assignment 1

1. Read sections 2.1, 2.2, and 2.3 in the textbook.
2. What parts of the reading did you find challenging or unclear? What words did you have to look-up elsewhere? What parts would you like to understand better? What arguments were you unable to follow?
3. Search online for a continuous parametrization of a trefoil<sup>1</sup>, i.e. a continuous function  $f : [0, 1] \rightarrow \mathbb{R}^3$  whose image is a trefoil knot, satisfying the conditions at the top of page 12. According to the second-to-last paragraph on page 13, one remedy to avoid “wild” knots is to demand that our function  $f$  is smooth and has “unit velocity.” Is your parametrization smooth? And if so, is it of unit velocity?
4. In section 2, we define a knot to be a simple, closed, polygonal curve in space. Find an explicit model of the right-handed trefoil knot, expressed using the book’s  $[p, q]$ -line segment notation. (Hint: we will use this later, and it will be easier if you make your trefoil as symmetric as possible). (To think about for fun: What do you think is the minimum number of vertices required to make a trefoil?)
5. On page 19, the author says that you may verify that the definition of knot equivalence is an equivalence relation. Do this. (Look up “equivalence relation” on the internet if you need a reminder.)

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<sup>1</sup>Or try to cook one up yourself, if you really feel like a challenge