Math 496, Fall 2013: Homework 2

Due Monday October 21

Problem 1: (a) Calculate the *Kauffman bracket* of the knot 4_1. See the table on page 280 for a projection of the knot.

(b) Use your answer from (a) to calculate the *Jones polynomial* of the knot 4_1.

Problem 2: Let L be an oriented 2-component link.

(a) Show that the Jones polynomial of L remains unchanged if we change the orientation of both compenents of L.

(b) What happens to the Jones polynomial of L if we change the orientation of only one component of L? Back up your answer by direct proof, reference to a theorem or by (counter)example

Problem 3: Give an example of an infinite family of different knots. You must show that your knots are different by direct arguments or by carefully referring to theorems you know.

Problem 4: Let D be a reduced, connected, alternating projection of a link. Let $r(D)$ denote the number of regions in D and let $r(D)$ denote the number of crossings in D. Prove that

$$r(D) = c(D) + 2.$$

Problem 5: Solve exercise 6.16 on page 167 of the book.

Problem 6: Use Problem 4 to show that the 2-component link shown in Figure 6.28 (page 169 of the book) is not *splittable*.