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 components 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 $c(D)$ 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*. 