Exercise sheet 3

Knots and Braids, MTH436

1. Compute the knot group of the n-component link.
2. Use the fundamental group to prove that the figure eight knot is non-trivial.
3. Prove that infinite cyclic cover of the complement of a knot that we constructed in class is indeed a cover.
4. Prove that the infinite cyclic cover of the knot complement is unique.
5. For the complement of a knot $X := S^3 \setminus K$, construct a finite cycle cover X_k with deck transformation group $\mathbb{Z}/k$ and prove that it is indeed a covering space.
6. Prove that the infinite cyclic cover covers X_k and that X_k is a quotient of the infinite cyclic cover.
7. Prove that for each $k \in \mathbb{N}$, there is a unique X_k covering $S^3 \setminus K$.