

**Representation theory and knot invariants - exercises**

- (1) Find three knots that are pairwise different.
- (2) Find three links with two components each that are pairwise different.
- (3) Determine all invertible Laurent polynomials in
  - (a)  $\mathbb{C}[x, x^{-1}]$ ,
  - (b)  $R[x, x^{-1}]$ , for  $R$  a domain, and
  - (c)  $R[x, x^{-1}]$ , for  $R$  any commutative ring.
- (4) Define what it means for a group to be free abelian and determine, up to isomorphism, all free abelian groups with not more than three generators. Write free abelian groups as quotients of free groups.
- (5) Give further examples of free algebraic structures.
- (6) Give presentations of
  - (a) the dihedral group with  $2n$  elements,
  - (b) the group  $\mathbb{Z}/a\mathbb{Z} \times \mathbb{Z}/b\mathbb{Z}$ ,
  - (c) the symmetric group  $\Sigma_n$ .
- (7) Describe the group with two generators  $a$  and  $b$  and relations  $a^2$  and  $(ab)^2$ .

This will be discussed in the problem class on Thursday, 25th of April.

Homepage of the course:

<http://www.iaz.uni-stuttgart.de/LstAGeoAlg/Koenig/knotsreps/Knotsreps.html>