Algebra qualifying exam
June 1, 2011

1. Classify the groups of order 105, up to isomorphism, and give a presentation of each group.

2.

a) Compute $\mathrm{Ext}^i_{\mathbb{Z}}(\mathbb{Z}/6\mathbb{Z}, \mathbb{Z}/15\mathbb{Z})$ for all i.

b) Compute $\mathrm{Tor}_i^{\mathbb{Z}}(\mathbb{Z}/6\mathbb{Z}, \mathbb{Z}/15\mathbb{Z})$ for all i.

3. Let W denote the unique irreducible two dimensional complex representation of the symmetric group S_3