Homework 4
Due in class TUESDAY, 2/4

These exercises should be viewed as a suggested minimum. Some subset of these exercises will be graded and you are encouraged to try all of the exercises in the indicated book sections.

Exercises from text:

Section 8: 12, 42, 46
Section 9: 9, 12, 29, 33 – 35

Additional Exercise(s):

1. Let f be a group isomorphism of S_3 with itself. Prove that there exists some $\sigma \in S_3$ such that $f(\tau) = \sigma\tau\sigma^{-1}$ for all $\tau \in S_3$ (that is, σ does not depend on τ).

Hint(s):

Section 9:

29. In the case where not all permutations in H are even, fix some odd $\sigma \in H$. Similar to what we showed in class, $\lambda_\sigma : H \to H$, $\tau \mapsto \sigma\tau$ is a permutation of H. Can you say anything about the images of odd elements? Even elements?
34. You may assume $\sigma = (1, 2, \ldots, m)$ for some odd m.

Additional Exercise:

1. For each $\sigma \in S_3$, prove that $c_\sigma : S_3 \to S_3$, $\tau \mapsto \sigma\tau\sigma^{-1}$ is an isomorphism and that $c_\sigma \neq c_\rho$ if $\sigma \neq \rho$. (You may find #47 from Section 8 to be helpful.) Then examine the possibilities for what f does to transpositions to find an upper bound on the number of possibilities for f.