MAT 312/AMS 351 – Fall 2010
Homework 9

1. Calculate the order of the permutation

$$\pi = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 4 & 6 & 1 & 8 & 2 & 5 & 7 & 3 \end{pmatrix}.$$

   Hint: write it first in cycle notation.

2. Same question for

$$\pi = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 4 & 1 & 5 & 7 & 6 & 3 & 8 & 2 \end{pmatrix}.$$

3. Give a conjugacy σ relating $\pi_1 = (1547)(263)$ to $\pi_2 = (123)(4567)$, so that $\pi_2 = \sigma\pi_1\sigma^{-1}$. Check that it works.

4. Prove that two conjugate permutations have the same order.

5. Break up S(5) into conjugacy classes (following our work in class with S(4): list the possible shapes, and count how many permutations have each shape). Check that the sum of the populations of your conjugacy classes is 120.

6. Show that the only possible orders for a permutation in S(5) are 1, 2, 3, 4, 5, 6. What happens for S(6)? S(7)?