Write up and turn in solutions to the highlighted problems from the list below. However, solve all other problems as well. The quizzes will cover the complete list of homework problems.

**Due date:** Friday, November 1, in the beginning of the recitation. *NO LATE HOMEWORK WILL BE ACCEPTED.*

**Problems.**

1. Problem 14 on page 53 of Herstein.
   
   Hint: Consider $G = A_4$, $F = \{Id, (1, 2)(3, 4), (1, 3)(2, 4), (1, 4)(2, 3)\}$ and $E = \{Id, (1, 2)(3, 4)\}$.

2. The following problems on pages 80–81 of Herstein: 1, 2, 3, 7, 8, 10, 18, 20.

3. A transposition $(i, j)$ is called an adjacent transposition if $j = i + 1$ or $i = 1$ and $j = n$.
   
   (a) Show that any transposition is a product of an odd number of adjacent transpositions.
   
   (b) Use (a) to give a simple proof of the fact (proved in class) that $\text{sign}(\sigma) = -1$ for every transposition $\sigma \in S_n$. Recall that $\text{sign}(\sigma) = \prod_{i<j} \frac{\sigma(i) - \sigma(j)}{i-j}$. 