CSU Math 366

Homework 6

Due Friday, March 27 at 5pm

I will get you information about how to take a picture of your hand-written homework and then submit it online.

Reading. Chapters 5 and 6

Remark. Make grammatically correct sentences by adding in just a few English words.

Problems.

1. Write the element $(1243)(89)(236)(189673)(783) \in S_9$ in disjoint cycle form.

2. Let $\alpha = (14)(2345)(238)(179825) \in S_9$. Write $\alpha^{-1} \in S_9$ in disjoint cycle form. Check that your answer is correct by computing $\alpha\alpha^{-1}$ and $\alpha^{-1}\alpha$.

   Hint: My suggestion is to first write α in disjoint cycle form. This isn't necessary, but I think it is helpful.

3. Write the element $\beta = (15246)(357)(9832657) \in S_9$ as a product of (not necessarily disjoint) 2-cycles. Is β an element of the alternating group A_9?

4. Prove that the group S_n of permutations of $\{1, 2, 3, \ldots, n-1, n\}$ has $n! = n \cdot (n-1) \cdot (n-2) \cdots 3 \cdot 2 \cdot 1$ elements. In other words, prove that there are $n!$ permutations of the set $\{1, 2, \ldots, n\}$.

   Hint: Recall that a permutation of $\{1, 2, \ldots, n\}$ is a bijective function $f \colon \{1, 2, \ldots, n\} \to \{1, 2, \ldots, n\}$.