Math 502 Problem Set #13 Due week of Nov. 27, 2017, in lab.

Review Artin, Chapter 7, sections 1-7.

1. From Artin, Chapter 7, do problems 5.7 (you may assume $n > 4$), 6.1, 7.2, and 7.4(a) (pages 221-228).

2. Prove, or disprove by example: If $n \geq 4$, and if $g, h \in A_n$ are conjugate elements of S_n, then g, h are conjugate in A_n.

3. a) Find the centralizer of the element $(1, 2, 3)$ in S_5.

b) Find the normalizer of the subgroup $\langle (1, 2, 3) \rangle$ of S_5.

4. a) Prove that if G is a simple p-group, then G has order p.

b) Suppose that G is a simple group of order n, with $60 < n < 70$. Prove that G is cyclic of prime order.

5. a) Find all groups of order 33.

b) Find all groups of order 175.

c) Find all groups of order 34. [Hint: For which n is there an element of order n? For each such n, how many elements can have order n? If g has order 17 and h has order 2, what is hgh^{-1}?]