

Day 11 homework - Assigned 2/10 and due 2/21

**Note:** Material from Chapter 4 will not appear on the first midterm. It may be advantageous to wait until after the midterm to work on this assignment.

Starred problems below are extra-credit for undergraduates and required for graduate students.

1. Let  $G = \langle a \rangle$  be a cyclic group of order 30. What are all the generators of  $G$ ? How many elements of order 2 does  $G$  contain?
2. Suppose that  $a$  and  $b$  are elements of a group,  $a$  has odd order, and  $aba^{-1} = b^{-1}$ . Show that  $b^2 = e$ .
3. Prove that a finite group  $G$  is a union of proper subgroups if and only if it is not cyclic.