HW #7, due March 4th

Chapter 6: 30, 33, 40
Chapter 7: 3, 6, 7, 12, 14, 15, 18-22, 24, 27, 31, 33, 36, 45

Extra Problems for HW #7

**Problem 1:** Show that if $|G : H| = 2$, then $aH = Ha$ for every $a \in G$.

**Problem 2:** If $A_n$ is the alternating group of degree $n$ and $S_n$ is the $n$th symmetric group, find $|S_n : A_n|$.

**Problem 3:** Suppose $K = \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$, $G = \left\{ \begin{pmatrix} a & b \\ 0 & c \end{pmatrix} \in \text{GL}(2, \mathbb{Z}) \mid ac = \pm 1 \right\}$, and $H = \{ M \in G \mid b = 0 \}$.

a.) Show that $H \leq G \leq \text{GL}(2, \mathbb{Z})$.

b.) Show that $x<K> = <K>x$ for every $x \in G$.

**Bonus Problem:** 7.28