HW #2, due September 7th

Chapter 1: 10, 11
Chapter 2: 3, 8, 9, 14, 16, 21, 29, 37
Chapter 3: 2, 6, 10

Extra Problems for HW #2

**Problem 1:** Let H and K be subgroups of a group G. Determine if the following are subgroups of G. If one is not a subgroup, then give a counterexample.

(i) $H \cap K$

(ii) $H \cup K$

**Problem 2:** Determine which are the following are subgroups of the given group G. If it is a subgroup, determine whether or not it is Abelian. For this problem, assume $p$ is prime, and set $B(\mathbb{N}) = \{\text{all bijections from } \mathbb{N} \text{ to } \mathbb{N}\}$.

(i) $\{ M \in GL(2, \mathbb{R}) | M^2 = I_2 \}; \ G = GL(2, \mathbb{R})$

(ii) $\{ a/p^k \in \mathbb{Q} | a, k \in \mathbb{Z} \}; \ G = (\mathbb{Q}^*, \cdot)$

(iii) $\{a/b \in \mathbb{Q} | a, b \in \mathbb{Z} \text{ and } \gcd(b, p) = 1\}; \ G = (\mathbb{Q}, +)$

(iv) $\{ f \in B(\mathbb{N}) | f(n) = n \text{ for infinitely many } n \in \mathbb{N}\}; \ G = (B(\mathbb{N}), \circ)$