Reading Questions 11

page 61: Definition 2.60

page 62: Lemma 2.63 and its proof

1. If H is a subgroup of G then the identity element of G is the identity element for H.
2. If G is a group then the empty set is a subgroup of G.
3. If G is a group then G is a subgroup of G.
4. Let $(G, \cdot)$ be a group, and let H be a non-empty subset of G. The subset H is a subgroup of G if $(H, \cdot)$ is a group. Why does H need to be nonempty in this definition?

Section 2.6 Subgroups (Part 1)

subgroups

P 1. List all the subgroups of D_8.

P 2. Prove or disprove: $(\{0, 1, 2, 3, 4, 5\}, +)$ is a subgroup of Z_8.

P 3. Prove the following statement. Let G be a group and let H be a nonempty subset of G. If $ab^{-1} \in H$ for all $a, b \in H$ then H is a subgroup of G.

minimal subgroups

P 4. Let $X = [5]$ and $P :=$ contains only even numbers. Does X have a smallest subset containing P? If so, what is it?

P 5. Let $X = \{R_{180}, D\}$ and $G = D_8$. Find $< X >$.