1. Define “Group”.

2. Define “subgroup”.

3. True or False (If true, then prove it. If false, then give a counterexample.) If $H$ and $K$ are subgroups of the group $G$, then the intersection of $H$ and $K$ is a subgroup of $G$.

4. True or False (If true, then prove it. If false, then give a counterexample.) If $H$ and $K$ are subgroups of the group $G$, then the union of $H$ and $K$ is a subgroup of $G$.

5. True or False (If true, then prove it. If false, then give a counterexample.) If $H$ and $K$ are non-zero subgroups of $(\mathbb{Q}, +)$, then the intersection of $H$ and $K$ is non-zero.

6. True or False (If true, then prove it. If false, then give a counterexample.) If $H$ and $K$ are non-zero subgroups of $(\mathbb{R}, +)$, then the intersection of $H$ and $K$ is non-zero.

7. True or False (If true, then prove it. If false, then give a counterexample.) If $(G, \ast)$ is an abelian group and $H = \{ g \in G \mid g \ast g = e \}$, then $H$ is a subgroup of $G$.

8. True or False (If true, then prove it. If false, then give a counterexample.) If $(G, \ast)$ is a group and $H = \{ g \in G \mid g \ast g = e \}$, then $H$ is a subgroup of $G$. 