

Problem 5. Determine whether the following statements are True or False. Justify your answer with a proof or a counterexample as appropriate.

(i) If H and K are subgroups of a group G , then $H \cup K$ is a subgroup of G .

(ii) If G is a group, then $Z(G) = \{g \in G : xg = gx \text{ for every } x \in G\}$ is an abelian subgroup of G .

(iii) S_3 is isomorphic to $(\mathbb{Z}_6, +)$.