1. (a) Give an example of an Abelian group which is not cyclic. No justification required.
   (b) Show that $GL_2\mathbb{R}$ is not Abelian.
   (c) List the elements in each of the three cosets in $U(7)/\langle 6 \rangle$.
   (d) Show that $\{(),(12)\} \not\triangleleft S_3$.

2. Let $G$ be an Abelian group. Show that the subset $H = \{g \mid g^2 = e\}$ is a subgroup of $G$.

3. Find the number of subgroups of order 20 in $\mathbb{Z}_6 \oplus \mathbb{Z}_{10}$.


5. Suppose $H \leq G$. Using only the definition of a coset prove that $aH = bH$ iff $a^{-1}b \in H$.

6. (a) Prove that $\mathbb{R}^* \not\approx \mathbb{R}^+$.
   (b) Prove that $\mathbb{R} \approx \mathbb{R}^+$.

7. Let $G = \mathbb{R}/\mathbb{Z}$.
   (a) Prove that $G$ has elements of every positive integer order.
   (b) Prove that $G$ has elements of infinite order.

The End