Algebraic and Geometric Methods in Engineering and Physics

Homework 1

Due on September 28

1. Let $\mathcal{P}(\mathbb{N})$ be the set of all subsets of $\mathbb{N}$. Show that the relation $\sim$ defined by $A \sim B$ if and only if there exists a bijection $f : A \to B$ is an equivalence relation. How many equivalence classes contain an infinite set?

2. Construct all possible multiplication tables for finite groups G of orders 4 and 5, and show that all these groups are abelian. (**Hint:** For each $g \in G$ the set $\langle g \rangle = \{g^n : n \in \mathbb{Z}\}$ is a subgroup of G).