



Philadelphia University
Department of Basic Sciences and Mathematics

Final Exam

Abstract Algebra I (250342)

02/02/2017

Name: _____ **Number:** _____ **Section:** _____

Question 1:(8 points)

1.
 - a) Write the definition of a group.
 - b) Give one example of a group.
 - c) Give one counter-example of a set with binary operation that is not a group.

2. Let G be a cyclic group. Prove that every subgroup of G is cyclic.

Question 2:(7 points)

1. Let G be a cyclic group of order n . Prove that G is isomorphic to \mathbb{Z}_n .

2. Compute $|5|$ in the group U_{13} .

3. Count how many abelian groups of order 1,000,000.

Question 3: (15 points)

1. Let $f = (1,3,5)(2,4)$ and $g = (1,6,5,3)$ in S_6 . Compute $f \circ g$ and $g \circ f$.

2. Let $A_n = \{f \in S_n \mid f \text{ is even}\}$. Prove that A_n is a subgroup of S_n .

3. Make the Cayley table for D_3 .

4. Write all the elements of D_4 .

5. Find all the cosets for the subgroup $\langle (1,4)(2,3) \rangle$ in the group D_5 .