

Math 360 – Abstract Algebra – Assignment 4

1. For each of the following permutations a tell me
 - a) What is a^2 ?
 - b) What is the order of a ?
 - c) Is a odd or even?
 - i. $a = (12)(345)$
 - ii. $a = (123)(45678)$
 - iii. $a = (12)(3456)$

2. a) Show that $S_6 = \langle (12), (13), (14), (15), (16) \rangle$. (You only need to show that you can generate any cycle in S_6 with these five elements alone)
 - b) Show that $S_6 = \langle (12)(123456) \rangle$. (Same comment as in part a)

3. For each of the following, decide whether the two groups are isomorphic. If they are, give an isomorphism between them. If they're not, give one difference in the structure of the two groups.
 - a) $\mathbf{Z}_3 \times \mathbf{Z}_2$ and \mathbf{Z}_6
 - b) $\mathbf{Z}_4 \times \mathbf{Z}_2$ and \mathbf{Z}_8

4. a) List the elements of $G = \mathbf{Z}_4 \times \mathbf{Z}_2$ and tell me the order of each.
 - b) Is there an automorphism of G that takes $(1, 1)$ to $(3, 1)$? Either give me one such automorphism or prove that no such automorphism exists.
 - c) Is there an automorphism of G that takes $(2, 0)$ to $(0, 1)$? Either give me one such automorphism or prove that no such automorphism exists.