

Name _____

Mathematics 309a: Abstract Algebra
Winter Semester 2009

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Quiz #7

February 24

Using cycle notation, the 24 elements of S_4 are

$\{ \iota, (12), (13), (14), (23), (24), (34),$
 $(123), (132), (124), (142), (134), (143), (234), (243),$
 $(1234), (13)(24), (1432), (1324), (12)(34), (1423), (1243), (14)(23), (1342) \} .$

1. Circle the elements of A_4 , the subgroup of all even permutations in S_4 :

$\{ \iota, (12), (13), (14), (23), (24), (34),$
 $(123), (132), (124), (142), (134), (143), (234), (243),$
 $(1234), (13)(24), (1432), (1324), (12)(34), (1423), (1243), (14)(23), (1342) \} .$

2. A_4 has _____ elements.

3. $H = \{ \iota, (12)(34), (13)(24), (14)(23) \}$ is a subgroup of A_4 . Since H has 4 elements, it must

be either V , or Z_4 . Which one is it? _____

Why? _____

4. $\langle (123) \rangle$ is a cyclic subgroup of A_4 generated by (123) . Write out its elements:

5. $\langle (1423) \rangle$ is a cyclic subgroup of S_4 generated by (1423) . Write out its elements:

6. Give a subgroup of A_4 that has 3 elements. _____

7. Give a subgroup of A_4 that has 2 elements. _____