

Math H113 Sample Exam 1

February 10, 2006

All questions carry equal weight. State answers clearly and carefully, and justify all assertions with proofs or counterexamples. You may not use any books or notes.

(1) Describe 8 non-isomorphic groups of order 36.

(2) Let G be a subgroup of S_6 , and assume that G has an element of order 6. Show that G contains a normal subgroup of index 2.

(3) How many distinct isomorphisms are there from S_4 to itself?

(4) Let G be a finite group, and let S be the set of elements $g \in G$ such that $g = g^{-1}$. Show that $|G|$ is even if and only if S has more than one element.