MATH 551 HOMEWORK 4

DUE WEDNESDAY, OCTOBER 5

You are encouraged to work on the homework together, but your final write-up should be your own. Please write down on your homework the name of any collaborators. No late homework will be accepted. "Hungerford I.1.3" means Question 3 in the exercises at the end of Section 1 of Chapter 1.

(1) Hungerford I.9.3
(2) Hungerford I.9.8
(3) Hungerford II.1.2
(4) Hungerford II.1.10
(5) Hungerford II.1.11
(6) Show that the group of automorphisms of $\mathbb{Z}^n$ is isomorphic to the group of $n \times n$ matrices with integer entries and determinant ± 1.
(7) **Written Qualifying Exam, Fall 2004**: Let G be the set of all complex 3×3 matrices which have exactly one nonzero element in every row and in every column. Show that G is a group under matrix multiplication. Show that G has two normal subgroups G_1 and G_2 with $G_1 \subset G_2 \subset G$ such that G_1, G_2/G_1 and G/G_2 are all abelian groups. (The original question let you assume that G is a group).