

# Homework #2 Problem

Math 430 - Spring 2013

The following statements are claimed at the bottom of page 155 in Section 16 of the text (with the exception of the “faithful” part of **(b)** below). Here, you will prove them.

Suppose  $G$  is a group which acts on the set  $X$ . Define  $N$  as

$$N = \{g \in G \mid g * x = x \text{ for all } x \in X\}.$$

**(a):** Prove that  $N \triangleleft G$ .

**(b):** Prove there is an action of  $G/N$  on  $X$  defined by  $(gN) \cdot x = g * x$  (that is, this is a well-defined operation which satisfies the definition of a group action), and that this is a faithful action.