

## UW Math Circle Homework

1. Let  $a$  and  $b$  be elements of a group  $G$  with action  $*$ . Show that  $a * b = b * a$  if and only if  $b * a * b^{-1} = a$ .

2. Let  $G$  be any finite group with action  $*$  and let  $g$  be an element of  $G$ . Using our new notation, we can define the order of  $g$  to be the smallest number of  $g$ 's such that

$$g * g * \cdots * g = e$$

Show that the order of  $g$  is less than or equal to the size of  $G$ .