

## Additional Group Problems Assignment 15

1. Show that mapping  $a \rightarrow \ln(a)$  is an isomorphism from  $\mathbb{R}^+ = \{x \in \mathbb{R} : x > 0\}$  (under multiplication) to  $\mathbb{R}$  (under addition).
2. Suppose that  $G$  is a group. In class we defined for each  $g \in G$ ,  $\sigma_g : G \rightarrow G$  by  $\sigma_g(x) = gx$  for  $x \in G$ .
  - (a) Show that for all  $g \in G$ ,  $\sigma_g \in S_G$ .
  - (b) Show that for all  $g \in G$ ,  $(\sigma_g)^{-1} = \sigma_{g^{-1}}$ .
3. Suppose that  $\phi$  is an isomorphism between two groups  $G_1$  and  $G_2$ . Show that for all  $a \in G_1$  then  $\phi(a^{-1}) = (\phi(a))^{-1}$ .