

Math 421 Problem Set
October 13, 2022

1. Let $H = \langle s \rangle \leq D_8$.
 - (a) Find all the left cosets and all the right cosets of $\langle s \rangle$ in D_8 . Is it the case that $gH = Hg$ for all $g \in D_8$?
 - (b) Show that the multiplication on left cosets of H is *not* well-defined. (In particular, this means that H can't be the kernel of any homomorphism.)

2. Let $H \leq G$. Prove that the function $f : G \rightarrow G$ defined $f(x) = x^{-1}$ sends each left coset of H to a right coset of H and gives a bijection between the left cosets and right cosets. (Thus the number of left cosets equal the number of right cosets.)