

MAT 150A, Fall 2023
Homework 2

Due before 2:10 on Wednesday, October 11

Please write the homework solutions in connected sentences and explain your work. Mark the answers to each question. Scan or take pictures of your homework and upload it to Gradescope before due time.

1. Let x, y, z and w be elements of a group G .
 - a) Solve for y given that $xyz^{-1}w = 1$.
 - b) Suppose that $xyz = 1$. Does it follow that $yzx = 1$? Does it follow that $yxz = 1$?
2. How many elements of order 2 does the symmetric group S_4 contain?
3. Find the order of the permutation

$$f = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\ 3 & 10 & 7 & 6 & 2 & 5 & 9 & 4 & 1 & 8 \end{pmatrix}$$

4. Determine if the following subset H is a subgroup of G :
 - a) $G = (\mathbb{Z}, +)$ and H is the set of positive integers.
 - b) $G = (\mathbb{R}^*, \cdot)$ and H is the set of positive real numbers.
 - c) G is the set of invertible $n \times n$ matrices and H is the set of $n \times n$ matrices with determinant 1.