

MAT 150A, Fall 2023  
Homework 1

**Due before 2:10 on Wednesday, October 4**

*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. Compute the products  $fg$  and  $gf$  for the permutations

$$f = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ 4 & 3 & 7 & 1 & 2 & 6 & 5 \end{pmatrix}, \quad g = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ 7 & 6 & 5 & 4 & 3 & 2 & 1 \end{pmatrix}.$$

2. Write the following permutations as products of disjoint cycles:  
 $(1\ 2)(1\ 3)(1\ 4)(1\ 5)$ ,  $(1\ 2\ 3)(2\ 3\ 4)(3\ 4\ 5)$ ,  $(1\ 2\ 3\ 4)(2\ 3\ 4\ 5)$ ,  $(1\ 2)(2\ 3)(3\ 4)(4\ 5)(5\ 1)$ .
3. Present the following permutation as a product of disjoint cycles for all  $k$ :

$$(1\ 2\ 3)^k = \underbrace{(1\ 2\ 3) \cdots (1\ 2\ 3)}_{k \text{ times}}.$$

4. Find the number of even and odd permutations in  $S_n$  for  $n = 1, 2, 3, 4$ .