MAT 150A, Fall 2021
Homework 1
Due before 12:10 on Wednesday, September 29

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

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 $n = 1, 2, 3, 4$.