

# Math 2001 - Writing project 4

First draft due April 20, final draft April 27, 2020

The following **writing project** will be graded on clarity and correctness and should be typed in LaTeX.

**Problem.** Let  $k, n \in \mathbb{N}$ . How many

- (1) functions,
- (2) injective functions,
- (3) surjective functions,
- (4) bijective functions,

are there from  $\{1, \dots, k\}$  to  $\{1, \dots, n\}$ ?

Your write up should include the following:

- (1) A section describing the problem with definitions of injective, surjective, bijective functions.
- (2) A theorem stating the answers to the questions above.
- (3) A proof of the theorem.

Hint: Recall the formulas for counting lists with/without repetitions and permutations for counting injective, bijective functions. For surjective functions use inclusion-exclusion.

- (4) Give precise arguments for all your statements.