

CMPT 451/813 — Assignment #1

2023–2024 T1

Due: 23:55, Wednesday October 11, 2022

I will put a spot up on Canvas for you to upload the assignment. Please take all your files and zip them up into one file and submit the zip file. If something goes wrong for some reason and you can't submit on canvas, then just email me your solutions as attachments to mcquillan@cs.usask.ca.

The assignment is to be completed *individually*. Discussion with others is fine, but there cannot be passing of data or communicating lines of specific code (see details on syllabus).

Exercise 1

There are three parts to this question

1. Implement a brute force exact algorithm to take a permutation π of $\{1, \dots, n\}$ as input, and it returns $d(\pi)$.

Hint: start by seeing if, given m , there is a sequence of m reversals that can rearrange π . This requires a brute force with a sequence of length $2m$.

2. For each n from 1 to 8, generate 5 random permutations of length n , and execute the brute force algorithm for each. For each *execution*, record the smallest distance possible, the execution time, and the lower bound. Present them in a table.
3. Consider the permutation $\pi = (4, 3, 6, 5, 1, 8, 7, 2)$. Find bounds on $d(\pi)$. Justify your answer.