# Midterm 2 Standard 3 - Exchange arguments

Due Date .......................................................................... May 3rd
Name .......................................................................... **Your Name**
Student ID .......................................................................... **Your Student ID**

## Contents

## 1 Instructions

- The solutions **should be typed**, using proper mathematical notation. We cannot accept hand-written solutions. Here's a short intro to LaTeX.

- You should submit your work through the **class Canvas page** only. Please submit one PDF file, compiled using this LaTeX template.

- You may not need a full page for your solutions; pagebreaks are there to help Gradescope automatically find where each problem is. Even if you do not attempt every problem, please submit this document with no fewer pages than the blank template (or Gradescope has issues with it).

- You **may not collaborate with other students**. **Copying from any source is an Honor Code violation. Furthermore, all submissions must be in your own words and reflect your understanding of the material.** If there is any confusion about this policy, it is your responsibility to clarify before the due date.

- Posting to **any** service including, but not limited to Chegg, Discord, Reddit, StackExchange, etc., for help on an assignment is a violation of the Honor Code.

# 2 Standard 3 - Exchange arguments

## 2.1 Problem 1

**Problem 1.** Consider the Interval Scheduling problem that takes as input a set of intervals $I$. Each interval $i \in I$ has a start value $i.start$ and an end value $i.end$ and returns a set of non-overlapping intervals of maximal size. Prove that the greedy choice of selecting the interval that ends first will yield an optimal solution.

*Answer.* Consider a situation where you have 3 intervals with {i.start,i.end} values of {1,3},{2,6},{4,5}. Now consider that we choose the interval {2,6}. This would result in a set of size 1 since it overlaps with the other two intervals. Now instead if we choose the the interval that ends first {1,3} we will return a set of size 2 which is the optimal solution. □