Assignment 1

csci2200, Algorithms

Instructions:

- Honor code: Work on this assignment alone, or with one partner. Between different teams, Collaboration is at level 1 [verbal collaboration only]
- Check out the Homework guidelines on class website.

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1. **Finding the 1's in a Matrix:** Consider an $n \times n$ array A which consists of 0's and 1's. Suppose each row consists of 1's and 0's such that, in any row i of A, all the 1's come before any 0's. Assuming A is already in memory, describe a method running in $O(n)$ time (*not* $O(n^2)$ time) for finding the row of A that contains the most 1's.

   We expect: (1) pseudocode and an English description of your algorithm; (2) a brief justification on why is it correct; (3) analysis of its running time.

2. **Finding min and max:** Describe a method for finding both the minimum and the maximum of n numbers with fewer than $3n/2$ comparisons in total. (Hint: Start by counting how many comparisons it takes to find the min and the max, and go from there).

   What we expect: The idea of the algorithm and pseudocode. A brief justification on why it finds the min and max correctly. Its analysis as function of n showing that it performs $3n/2$comparisons.