Homework 9

EXTRA CREDIT 2

Due Sunday April 26, 5 PM EST

Extra credit is worth one extra percent of your overall class grade. TAs will not answer Piazza questions or hours queries on any extra credit topics.

To submit your solutions, please make a directory ~/course/cs0160/extraCredit2 containing your solution PDF and then run the script cs0160_handin extraCredit2.

1 Written Problems

Problem 9.1
Adding an Edge

Given a graph $G$ of $V$ vertices and $E$ edges AND a minimum spanning tree $T$ of graph $G$, we would like to add a new edge $e$ with weight $w_e$ to $G$, forming a new graph $G'$. Describe an algorithm which constructs the minimum spanning tree of $G'$ in $O(V)$ time.

Problem 9.2
Rotated Array

Given a sorted array of $n$ integers that has been rotated an unknown number of times, give an $O(\log n)$ algorithm that finds an element in the array. Here, rotating an array once means shifting its elements one position to the left, such that the element that was originally first in the array becomes last. You may assume that the array was originally sorted in increasing order and there are no duplicates.

Problem 9.3
Rotated Array Part II

Now, it is given that in the array described above, the smallest integer has a value of 1, and the array contains only numerically consecutive integers. Write pseudocode to find how many times the original array was rotated.