CS2223
HW#5

DUE: Thursday, December 2

1. (5 points) Remember that a *simple path* visits each node on the path at most one time. Prove or give a counterexample to the following

CONJECTURE: If we replace the "min_priority_queue" of Dijkstra's Algorithm with a "max_priority_queue" (we always return and remove from C the node v which **maximize**s $D[v]$), then the algorithm returns the longest simple path from the source to each node.

2. (10 points) Test the hypothesis that INSERTIONSORT is faster than QUICKSORT on partially sorted arrays in the following way.

Write a program for INSERTIONSORT and provide evidence that it works correctly.
Write a program for QUICKSORT and provide evidence that it works correctly.
For several fairly large values of n, **do**:

for $k \leftarrow 1$ **to** n **do**

$T[k] \leftarrow$ random integer from the set $\{k-4, k-3, \ldots, k+3, k+4\} \cap \{1, \ldots, n\}$

Execute and time INSERTIONSORT and QUICKSORT on T
Find expressions to estimate the execution times of INSERTIONSORT and QUICKSORT as functions of n.

3. (5 points) Do **Problem 7.12** from our text.