3) (5 pts) ALG (Stacks/Queues)

Consider modeling cars lining up at a traffic light in a simulation. Would it be better to utilize a stack in the simulation or a queue, to store the cars? Clearly explain your choice.

A queue would be better. At a standard traffic light, the earlier a car gets to the light, the earlier the car gets to go through the light. Traffic works in this "fair" way - first in, first out.

In thinking about designing this system, we would have each road coming into a traffic light stored as a queue. If a particular light changes from red to green at some point in time, then the cars would get dequeued from that road/light pair and each one would potentially get enqueued into the next queue representing the road/light pair they were traveling to next. A good simulation would be able to handle some of this movement in parallel, carefully keeping track of time and would identify areas of bottlenecks. Namely, if a queue fills up and another car wants to enter the queue, it actually won't get to do so, since it'll get stuck at the previous light, even though it's green! (More than likely all UCF students who drive cars on campus have experienced this wonderful phenomenon.)

Grading: 0 pts if the answer is stack. 2 pts for saying queue, 3 pts for the explanation. The explanation can be as brief as the second sentence in this solution. The second paragraph is further explanation not required for full credit.

Computer Science Foundation Exam

August 25, 2018

Section I B

DATA STRUCTURES

SOLUTION

NO books, notes, or calculators may be used,
and you must work entirely on your own.

Name: _____

UCFID: _____

NID: _____

Question #	Max Pts	Category	Score
1	10	DSN	
2	5	ALG	
3	10	ALG	
TOTAL	25		

You must do all 3 problems in this section of the exam.

Problems will be graded based on the completeness of the solution steps and <u>not</u> graded based on the answer alone. Credit cannot be given unless all work is shown and is readable. Be complete, yet concise, and above all <u>be neat</u>. For each coding question, assume that all of the necessary includes (stdlib, stdio, math, string) for that particular question have been made.