

Program #6 - Due Tuesday, Oct. 13

You are to write a simulation of an overnight shift at a hospital emergency room. Starting at 10 pm, there is no one in the waiting room. Patients randomly arrive with varying degrees of ailments. The triage nurse assigns a priority to each patient and puts him or her into a priority queue. There are a number of examination rooms available; the patient at the head of the queue is placed into a room as soon as that room becomes available. The length of time each patient spends in the examination room that depends on the ailment they have (the more serious the ailment, the longer it will take for the doctor to treat the patient).

Your program should

1. Use a heap structure to implement a priority queue. You may use an array or a tree to implement the heap. (Remember that you will need to keep track of both the “root” of the heap and the “last” element in the heap.) However, you need to write code for removing the element with the smallest key (the “root”) and adding an element to the heap.
2. Run several simulations for specific parameters (rate at which patients arrive, how many different degrees of ailments are there, how long it takes to treat each ailment, how many exam rooms there are).
3. Change the parameters and run several simulations for each change.
4. Calculate the average waiting time each patient spends in the waiting room, the average time it takes to see each patient, and how many patients are still in the queue when the shift ends at 6 am the next morning.