CIS-277 Data Structures and Algorithms

Review: ADTs – Queue, Priority Queue, and Dequeue

1. Define the ADT: a. queue   b. dequeue   c. priority queue

2. Indicate the Big-O rate of growth of run-time for:

    a. Insertion into a queue that is implemented using and ordinary array with the front of the queue always maintained in component zero of the array.
    b. Deletion from a queue that is implemented using an ordinary component zero of the array.
    c. Deletion from a queue using a circular array implementation.

3. Given the following list of jobs and their associated priority class (the lower the number the higher the priority):

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  ➡      | J45 | J12 | J17 | J22 | J30 | J56 | J18 |      ➡
(back) |  3  |  4  |  2  |  1  |  3  |  2  |  4  |      (front)
```

Assuming that no other jobs arrive, list the order in which these jobs would be processed if:

a. a priority queue is used.
b. Describe three different schemes by which a priority class might be assigned to a job.
c. Explain what is meant by "starvation"
d. Explain what is meant by "aging"
e. Briefly describe the form of the data structure that you wold use to implement this ADT (include a diagram).

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4. Given that a queue is being represented by the following circular representation in an array (front is currently 4 and back is currently 7):

array component: 0   1   2   4   5   6   7   8

| | | | 37 | 41 | 12 | 34 | |

a. Show what this representation would like after the following sequence of operations are performed:

deq(q, i);
deq(q, j);
enq(q, 81);
enq(q, 72);
enq(q, 38);
deq(q, k);   (indicate the current position of front and back for each operation)

b. What is an advantage of this implementation of a queue?

c. What is a disadvantage of this implementation of a queue?