

## 3) (10 pts) ALG (Queues)

Consider the circular array implementation of a queue named Q, implemented with the structure shown below.

```
struct queue {  
    int *array;  
    int num_elements;  
    int front;  
    int capacity;  
};
```

Suppose the queue is created with a capacity of 5 and front and num\_elements are initialized to 0. Trace the status of the queue by showing the valid elements in the queue and the position of front after each of the operations shown below. Indicate front by making bold the element at the front of the queue.

1. enqueue(Q, 50);
2. enqueue(Q, 34);
3. enqueue(Q, 91);
4. x = dequeue(Q);
5. enqueue(Q, 23);
6. y = dequeue(Q);
7. enqueue(Q, y);
8. enqueue(Q, 15);
9. enqueue(Q, x);
10. x = dequeue(Q);

After stmt #1:

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After stmt #2:

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After stmt #3:

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After stmt #4:

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After stmt #5:

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After stmt #6:

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After stmt #7:

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After stmt #8:

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After stmt #9:

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After stmt #10:

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# Computer Science Foundation Exam

January 16, 2021

## Section I B

### DATA STRUCTURES

### ONLINE EXAM

**Directions:** You may either directly edit this document, or write out your answers in a .txt file, or scan your answers to .pdf and submit them in the COT 3960 Webcourses for the Assignment "Section I B". Please put your name, UCFID and NID on the top left hand corner of each document you submit. Please aim to submit 1 document, but if it's necessary, you may submit 2. Clearly mark for which question your work is associated with. If you choose to edit this document, please remove this cover page from the file you submit and make sure your name, UCFID and NID are on the top left hand corner of the next page (first page of your submission).

Question #	Max Pts	Category	Score
1	10	DSN	
2	5	ALG	
3	10	DSN	
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 not 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 be neat. For each coding question, assume that all of the necessary includes (stdlib, stdio, math, string) for that particular question have been made.**