

CMPS 223 Sample Midterm

1. Each data structure has certain properties to the data, such as how one can access the data inside the data structure. Give the rules for accessing data for each of the following data structures:
 - (a) Stack
 - (b) Queue
2. Give the pseudocode (just the pseudocode, not the actual C++ code) for the singly linked list `search` function that finds the first matching element in the list.
3. With the array-based implementation of the queue, “wrap-around” indices were used to keep track of the front and back of the queue, creating a “circular” array.
 - (a) Give the code to increment the back index.
 - (b) Why was a circular array used instead of a regular array?
 - (c) How is the empty state detected?
4. Give the code for the array-based queue `enqueue` function.
5. State how the following list variants differ from the basic linked list.
 - (a) Circular list
 - (b) Doubly linked list
6. Give the code for the linked list `insert` function.
7. Give the code for the array-based stack `pop` function.
8. You have a program with a pointer variable declared `int *p1`; and an integer variable declared `int v1`. The current state of the variables in memory is:

Memory Address	40	44	48	52	56
Value Stored	0	0	0	0	40
Variable Name	p1			v1	

Show the state of memory after executing the following lines of code:

- (a) `p1 = &v1;`
- (b) `*p1 = 100;`

Memory Address	40	44	48	52	56
Value Stored					
Variable Name	p1			v1	