

Name: _____

SID: _____

Quiz 2 – 25 points possible - 5 questions on 4 pages

(Do not spend more than 5 minutes on this page)

1. (8 pts) Give the Big-Oh running times for the following functions that most closely reflects the best possible implementation. You may justify your answer if you believe there is more than one reasonable solution: (*Source – lecture and textbook*)

- a) Performing binary search on a sorted array.

- b) Printing all elements in a doubly linked list

- c) Enqueuing into a circular array implementation of a queue.

- d) insertAfter for a linked list implemented sequence

- e) removeAtRank for an array implemented sequence

- f) $N + N \log N + 800 + \log N$

- g)

```
for ( x = 0; x < N * N * N; x ++ )  
    cout << x << endl;
```

- h) Push on to an array implemented stack

2. (2 pts) List 2 general factors that affect the running time of an algorithm. (Your answer should not talk about primitive operations or any coding constructs i.e if/else, while, for, etc) (*Source – lecture and textbook*)

(Do not spend more than 3 minutes on this page)

3. (6 pts) (*Source – lecture and textbook*)

a) What does LIFO stand for?

b) What abstract data type does it refer to?

c) List two uses/applications for this data type.

(Do not spend more than 5 minutes on this page)

4. (5 pts) Write Dequeue (Dequeue will return the item dequeued via a reference parameter to the function) **for an inefficient queue**, where the items are stored in an array in such a way that the queue's head is always at location 0 and the queue's tail is always at location `currentSizeOfQueue - 1`. **Give the Big-Oh running time of your dequeue function.** Remember to use good programming style. You may assume the following class definition exists:

```
class Queue {
private:
    itemtype Q[SIZE];
    int currentSizeOfQueue; // you may assume this variable is initialized to 0 in the
                           // constructor and is incremented on a successful enQ
public:
    void enQ ( itemtype item ); // assume already written
    void deQ ( itemtype& item); // remember to return item via the reference parameter
};
```

(Do not spend more than 7 minutes on this page)

5. (4 pts) Show how to implement a stack using two queues. Describe the push and pop functions. You may assume the Queue has the functions Enqueue, Dequeue, and isEmpty. You do not have to actually write code, you may just describe the method and use pictures, but be sure that you are clear. **Give the Big-Oh running time of the push and pop operations.** (*Source – modification of homework question*)