

**CS14 – Quiz 2**  
**20 points possible**

1. (4 pts) Briefly define the following:

a) Algorithm

b) Big-Oh notation

c) Stack

d) Queue

2. (2 pts) Give 2 benefits for using the Big-Oh notation to describe the runtime of an algorithm over measuring the actually physical time it takes to run the algorithm (clock or wall time).

3. (4.5 pts) Give the Big-Oh running time of the following:

- a) Push back in a doubly linked list with only a head pointer
- b) Search in an array implemented list
- c) Enqueue into an array implemented queue
- d) Dequeue from a linked list implemented queue
- e) Insert into a sorted array (**not** including the search phase)
- f) Insert into a sorted linked list (**not** including the search phase)
- g) Remove from an unsorted array (**not** including the search phase)
- h)  $n \lg n + \lg n + n^2 + 1600$
- i)  $18n + 50$

4. (2.5 pts) Put the following in order of ascending growth rate:

$n^n$ ,  $500n$ ,  $n \lg n$ ,  $7 \lg n$ ,  $2n^2$ ,  $n^{\lg n}$ ,  $2^n$ ,  $4$ ,  $1/n$

5. (7 pts) Write code to perform the member functions enqueue and dequeue using a singly linked list implementation of a Queue. Dequeue will simply remove the node to dequeue. **Give the Big-Oh runtime for each of the member functions that you write.** Remember to use good programming style. You may assume the following classes exist:

```
class Queue {
private:
    Node* front;
    Node* rear;
public:
    Node* getFront();
    void enqueue(itemtype item);
    void dequeue();
    bool isEmpty() { return (front == NULL); };
};

class Node {
friend class Queue;
private:
    Node* next;
    itemtype item;
};
```