University of Nevada, Las Vegas Computer Science 477/677 Fall 2015

Assignment 2: Due September 10, 2015

Name:_____

You are permitted to work in groups, get help from others, read books, and use the internet. But the handwriting on this document must be your own. You may attach extra sheets, using a stapler.

1. Assume that the variable **S** in the code below has type **stack of integer** and that the operators **pop**, **push**, **empty**, and **initialize** are properly implemented. What will the output be if the code is executed?

```
initialialize(S);
push(S,4);
push(S,2);
push(S,8);
cout << pop(S) << endl;
push(S,5);
push(S,pop(S)+1);
while(not empty(S))
  cout << pop(S) << endl;
```

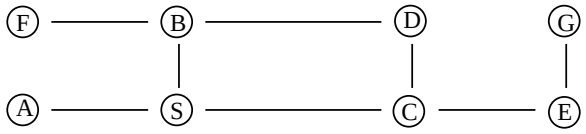
2. Assume that the variable **H** in the code below has type **min-heap of integer** and that the operators **delete-min**, **insert**, **empty**, and **initialize** are properly implemented. What will the output be if the code is executed?

```
initialialize(H);
insert(H,3);
insert(H,1);
insert(H,8);
cout << delete-min(H) << endl;
insert(H,4);
insert(H,delete-min(H)+2);
while(not empty(H))
  cout << delete-min(H) << endl;
```

3. In class, we have shown how to implement a queue as a circular linked list with a single pointer. Assume that the variable **Q** in the code below has type **queue of integer**, implemented as a circular linked list, and all the operators are properly implemented, as shown in class. Show, by drawing figures, the appearance of the linked list after each statement in the code below is executed. You should draw five figures.

```
intialize(Q);
enqueue(Q,5);
enqueue(Q,3);
cout << dequeue(Q) << endl;
enqueue(Q,2);
```

4. Execute a stack-based depth-first search algorithm which visits all nodes, starting from **S**, of the graph shown below. Show the data structures at each step. There is more than one stack-based algorithm for dfs. Choose one.



5. Execute a queue-based breadth-first search algorithm which visits all nodes, starting from **S**, of the graph shown below. Show the data structures at each step. There is more than one queue-based algorithm for bfs. Choose one.