CS-142 Exam2 Review

1. True/False: Node is a primitive JavaFX component.

2. True/False: In a non-weighted graph, a `breadth-first` search always guarantees to find the shortest path to the destination

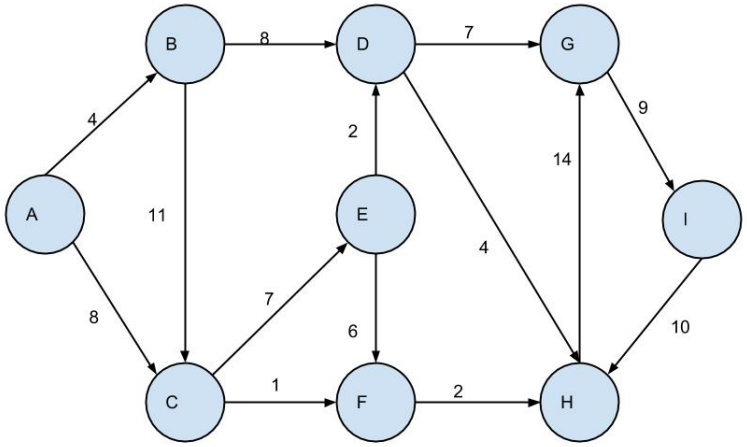
3. True/False: A `depth-first` search can never find the shortest path to the destination

4. What is the worse case complexity of a backtracking algorithm?

5. On a weighted graph, which of the following guaruntees to find a minimum-cost path between two vertices
   (a) Breadth-First Traversal
   (b) Depth-First Traversal
   (c) Dijkstra's algorithm
   (d) Sorting the weights and Binary Search

6. Whats the overall time complexity of Dijkstra's algorithm using a) a naive priority queue b) a heap? Explain.

7. Given the following graph



(a) Perform Dijkstra's shortest path algorithm on this graph to find the shortest distance from A to H. Include the following:

i. The final distance and predecessor values for all finalized vertices.

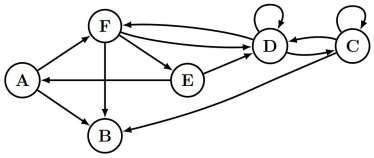
ii. The order in which the vertices are finalized.

iii. The list of vertices in the shortest path from A to H and the length of that path.

(b) When is a vertex's sum weight finalized in Dijkstras algorithm?

(c) What role does the priority queue play in finding the shortest path? When do we use it?

8. Consider the following directed graph



Give the adjacency-list representation of this graph

A breadth first traversal would visit the vertices in the order (Consider vertices in alphabetical order) -

(a) ABFDEC
(b) AFEBDC
(c) ABFDCE
(d) ABFCDE

A depth first traversal would visit the vertices in the order (Consider vertices in alphabetical order) -

(a) ABFDEC
(b) AFEBDC
(c) ABFDCE
(d) ABFDEC

9. Given this table of courses and prereqs, represent the table as a graph.

COURSE	IMMEDIATE PREREQS
CS1	CS4, CS6
CS2	-
CS3	-
CS4	CS2
CS5	CS2, CS3
CS6	CS5, CS7
CS7	-

10. Produce the sequence that shows the order of courses a person needs to take to graduate.

11. For a course graph with n vertices and m edges, what is the complexity of your approach?

12. If taking courses towards graduation, and you are repeatedly forced to retake a course, what must be true?

13. Name and describe 3 JavaFX layouts.

14. Describe what happens when you click on a Button.

15. Write code to print "action!" when an `ActionEvent` is received from a button.

16. Trace the exception thrown through the program. Explain why the exception is not being handled correctly. How can we fix it?

```
1  import java.io.FileNotFoundException;
2
3  public class ExExample {
4      public static void main(String[] args){
5          Something sw = new Something();
6          System.out.println(sw.doStuff("cool", "man"));
7
8      }
9  }
10
11 class Something {
12     public int doStuff(String s1, String s2){
13         try
14         {
15             return SomethingBad.doBadStuff(s1) + SomethingBad.doBadStuff(s2);
16         }
17         catch(FileNotFoundException fio)
18         {
```

```
19                 System.out.println("YOU FAILED!");
20             }
21         }
22 }
23
24 class SomethingBad {
25     public static int doBadStuff(String s){
26         return Integer.parseInt(s);
27     }
28 }
```

17. What do we add to our try/catch block to ensure a certain functionality gets done no matter what happens in our code?

18. Use what you know to design a Configuration class for the Map Coloring problem. This problem states that given any set of nodes, we want to be able to color each node such that no neighbor also has the same color. It should be able to work with any number of nodes and colors. More specifically, you must be able to generate a IsGoal(), IsValid(), and GetSuccessors() function for your Configuration file. Psuedocode is fine.

19. How does our backtracker use our configuration to solve the problem? How is the path returned?