

CS140b Spring 96 – Quiz 2

Prof. Frank Vahid

Name: _____ Student number: _____

1. (1 pt.) Why can there be no cross edges in a depth-first spanning tree, after adding remaining edges as dotted lines?
2. (1 pt.) What do the letters in *AOV* stand for? (The *AOV* discussed in chapter 6 of our textbook, that is!)
3. (2 pt.) List the data fields of a graph class and vertex class for an adjacency list representation, assuming vertices are represented as integers.
4. (2 pt.) Give the time complexity (using O notation) of finding a vertex's adjacent vertices for: (a) an adjacency matrix, (b) an adjacency list. If expressing the answer in terms of a vertex's degree provides a better upper bound, then do so.
5. (2 pt.) Give the time complexity of counting a graph's edges for: (a) an adjacency matrix, (b) an adjacency list.
6. (2 pt.) Give the space complexity of: (a) an adjacency matrix, (b) an adjacency list.
7. (2 pt.) (a) Find the two logical errors (bugs) in the following function, which is supposed to count the number of graph components. (b) How would you modify the function to use breadth-first search?

```
int Graph::CountComponents()
{
    visited = new Boolean[n];
    for (int i = 0; i < n; i++) visited[i] = FALSE;
    int count = 1;
    for (i = 0; i < n; i++)
        if (visited[i]) {
            cout << endl << "New Component :";
            count++;
            DFS(i); // DFS updates the visited array
        }
    delete [] visited;
    return count;
}
```