

CS140b Spring 96 – Quiz 3
Prof. Frank Vahid

Name: _____ Student number: _____

(Qualifier question) Write a C++ function, *IntsReverse*, that takes two integer arrays *s1* and *s2* and an integer *size* as parameters, and makes *s2* the reverse of *s1*. For example, if *s1* is (1 2 3 4), then *s2* would be (4 3 2 1). Do NOT use cin's, cout's.

1. (8 pt.) Complete the following. Justifying your answers might help gain partial credit. Assume each graph has N nodes. Each graph is undirected unless otherwise noted.
 - (a) The maximum edges in a graph: _____
 - (b) The maximum edges in a digraph: _____
 - (c) The minimum edges in a connected graph: _____
 - (d) The minimum edges in a digraph: _____
 - (e) The maximum edges in an acyclic graph: _____
 - (f) The maximum edges in a tree: _____
 - (g) The minimum edges in a tree: _____
 - (h) The number of edges in a graph where d_i represents the degree of vertex i : _____

2. (2 pt.) Draw a strongly connected directed graph with 4 vertices, using as few edges as possible.

3. (3 pt.) Circle the descriptions of a graph G that are equivalent to saying that G *must* be a tree:

G is acyclic and has $N-1$ edges.

There is exactly one simple path from any vertex to any other vertex.

G has $\frac{n(n-1)}{2}$ edges.

We can find a spanning tree for G .

G is connected, but removing any edge leaves it unconnected.

G has no cycles.

4. (2 pt.) Give the time complexity of printing a graph's edges for: (a) an adjacency matrix, (b) an adjacency list.

5. (2 pt.) Give the space complexity of: (a) an adjacency matrix, (b) an adjacency list.

6. (3 pt.) What is the relationship (if any) between each of the following:

(a) Articulation points and a biconnected graph:

(b) Cycles and a topological ordering:

(c) Trees and graphs:

(d) Money and happiness:

7. (2 pt.) Briefly explain whether or not each of the following can be used to find a spanning tree.

(a) DFS:

(b) BFS: