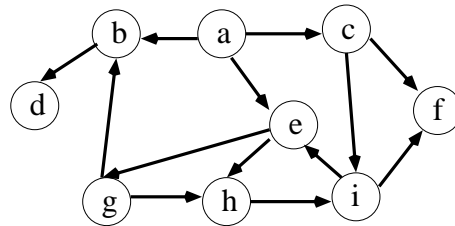


8. Homework

Due 4/14/09 before class

1. **Adjacency matrix (3 points)**

Give the adjacency matrix representation for the graph above. Assume that vertices are ordered alphabetically.

2. **Adjacency lists (3 points)**

Give the adjacency lists representation for the graph above. Assume that vertices (e.g., in an adjacency list) are ordered alphabetically.

3. **Depth-first search (6 points)**

Consider a depth-first traversal of the graph above, starting at vertex a . Assume the graph is given in your adjacency lists representation of question 2. Mark the results of the following subquestions in a copy of the drawn graph.

- (2 points) Give the discover time (d -value) and the finish time (f -value) of each vertex.
- (2 points) Draw the depth-first tree.
- (2 points) Mark each edge with its DFS classification (tree edge, back edge, forward edge, cross edge)

4. **Breadth-first search (4 points)**

Consider a breadth-first traversal of the graph above, starting at vertex a . Assume the graph is given in your adjacency lists representation of question 2. Mark the results of the following subquestions in a copy of the drawn graph.

- (2 points) Give the visit time stamp for each vertex (according to the pseudo code on slide 7).
- (2 points) Draw the breadth-first tree.

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5. **Adjacency matrix (4 points)**

Both breadth-first search (BFS) and depth-first search (DFS) assume that the graph is given in adjacency lists representation. Now, assume that the graph is given in an adjacency matrix.

- (a) (2 points) What part would change in the code for BFS? What would be the runtime for BFS? Justify your answer.
- (b) (2 points) What part would change in the code for DFS? What would be the runtime for DFS? Justify your answer.

6. **DAG (1 point)**

Is the graph above a directed acyclic graph (DAG)? Justify your answer.