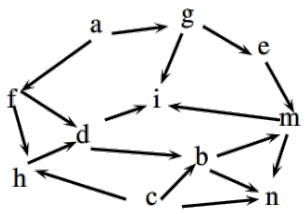
CSCD320 Homework7

Ethan Tuning

Problem 1. *Print the BFS and DFS that starts from the vertex d of the following graph. If a vertex has multiple next-hops, then search the next-hops in the order of their vertical coordinates from the lower ones to the higher ones.*



Answer 1. *BFS: d, h, b, f, i, c, n, m, a, g, e. DFS: d, b, i, n, m.*

Problem 2. *Given the adjacency list representation of an unweighted graph G = (V,E), give your pseudocode that constructs the matrix representation of G. Describe the time complexity of your algorithm in the big-oh notation and make your bound as tight as possible.*

Answer 2. *Here is the pseudocode:*

```
for i = 1 to n
  for j = 1 to n
    if j is in i's adjacency list
      write 1;
    else
      write 0;
```

Time complexity will be $O(\log n)$.

Problem 3. *The DFS algorithm that we discussed in class uses the adjacency list representation of a graph* $G = (V, E)$ *and its time cost is* $O(|V| + |E|)$. *Suppose you are only given the matrix representation of G, describe your pseudocode for DFS of G using the matrix representation. Give the time complexity of your algorithm in the big-oh notation and make your bound as tight as possible. Did you learn why we used the adjacency list representation for DFS in class?*

Answer 3. *Here is the pseudocode:*

```
for i = 1 to n
  if visited[i] = 0
    dfs(i); //call to the dfs list version
```

Time complexity will be $O(|V|^2)$. *This is terrible and we want to use the adjacency list version because it is way faster.*