Feedback — Exercises: Undirected Graphs

You submitted this quiz on **Sun 31 Mar 2013 10:59 PM PDT -0700**. You got a score of **3.00** out of **3.00**.

To specify an array or sequence of values in an answer, you must separate the values by a single space character (with no punctuation and with no leading or trailing whitespace). For example, if the question asks for the first ten powers of two (starting at 1), the only accepted answer is:

```
1 2 4 8 16 32 64 128 256 512
```

If you wish to discuss a particular question and answer in the forums, please post the entire question and answer, including the seed (which is used by the course staff to uniquely identify the question) and the explanation (which contains the correct answer).

Question 1

(seed = 262747)

Consider the adjacency-lists representation of a graph with 8 vertices and 9 edges:

```
    A:  F E B
    B:  G A
    C:  G D
    D:  G C
    E:  A F
    F:  A E
    G:  C D B H
    H:  G
```

Here is a graphical representation of the same graph:

```
    (A)-------------(B)             (C)-------------(D)
     |\               \              |              /
     | \               \             |             /
     |  \               \            |            /
     |   \               \           |           /
     |    \               \          |          /
     |     \               \         |         /
     |      \               \        |        /
     |       \               \       |       /
     |        \               \      |      /
     |         \               \     |     /
     |          \               \    |    /
     |           \               \   |   /
     |            \               \  |  /
     |             \               \ | /
     |              \               \|/
    (E)-------------(F)             (G)-------------(H)
```

Run depth-first search (using the adjacency-lists representation) from vertex A. Give the sequence in which depth-first search first visits the vertices (preorder).

You entered:

A F E B G C D H

Your Answer		Score	Explanation
A F E B G C D H	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

The correct answer is:

```
A F E B G C D H
```

```
Here is a trace of the depth-first search:

dfs(A)
  dfs(F)
    check A
    dfs(E)
      check A
      check F
    E done
  F done
  check E
  dfs(B)
    dfs(G)
      dfs(C)
        check G
        dfs(D)
          check G
          check C
        D done
      C done
      check D
      check B
      dfs(H)
        check G
      H done
    G done
    check A
  B done
A done
check B
check C
check D
check E
check F
check G
check H
```

The preorder is the order in which the vertices are first visited.

Question 2

(seed = 544295)

Consider the adjacency-lists representation of a graph with 8 vertices and 10 edges:

```
    A:  B E
    B:  A C E
    C:  F G B D
    D:  H G C
    E:  A B F
    F:  C E
    G:  C D
    H:  D
```

Here is a graphical representation of the same graph:

```
    (A)-------------(B)-------------(C)-------------(D)
     |              /               /|              /|
     |             /               / |             / |
     |            /               /  |            /  |
     |           /               /   |           /   |
     |          /               /    |          /    |
     |         /               /     |         /     |
     |        /               /      |        /      |
     |       /               /       |       /       |
     |      /               /        |      /        |
     |     /               /         |     /         |
     |    /               /          |    /          |
     |   /               /           |   /           |
     |  /               /            |  /            |
     | /               /             | /             |
     |/               /              |/              |
    (E)-------------(F)             (G)             (H)
```

Run breath-first search (using the adjacency-lists representation) from vertex A. Give the sequence

```
in which the vertices are dequeued from the FIFO queue.
```

You entered:

ABECFGDH

Your Answer		Score	Explanation
ABECFGDH	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

The correct answer is:

```
A B E C F G D H
```

```
Here is a trace of the breadth-first search:

enqueue A
dequeue A
   enqueue B
   enqueue E
dequeue B
   check A
   enqueue C
   check E
dequeue E
   check A
   check B
   enqueue F
dequeue C
   check F
   enqueue G
   check B
   enqueue D
dequeue F
   check C
   check E
dequeue G
   check C
   check D
dequeue D
   enqueue H
   check G
   check C
dequeue H
   check D


Here are the shortest paths and distances:

A to A (0):  A
A to B (1):  A-B
A to C (2):  A-B-C
A to D (3):  A-B-C-D
A to E (1):  A-E
A to F (2):  A-E-F
A to G (3):  A-B-C-G
A to H (4):  A-B-C-D-H


Here is the shortest-paths tree from A:
    (A)------------>(B)------------>(C)------------>(D)
     |                               |               |
     |                               |               |
     |                               |               |
     |                               |               |
     |                               |               |
     |                               |               |
     |                               |               |
     |                               |               |
     |                               |               |
     |                               |               |
     |                               |               |
     |                               |               |
     |                               |               |
     |                               |               |
     v                               v               v
    (E)------------>(F)             (G)             (H)
```

Question 3

(seed = 863998)

Consider the adjacency-lists representation of a graph with 10 vertices and 11 edges:

```
    A:  B F
    B:  A F
    C:  D H G
    D:  C H I
    E:  J
    F:  B A
    G:  C H
    H:  C D I G
    I:  H D
    J:  E
```

Here is a graphical representation of the same graph:

```
    (A)-------------(B)             (C)-------------(D)             (E)
     |              /               /|              /|               |
     |             /               / |             / |               |
     |            /               /  |            /  |               |
     |           /               /   |           /   |               |
     |          /               /    |          /    |               |
     |         /               /     |         /     |               |
     |        /               /      |        /      |               |
     |       /               /       |       /       |               |
     |      /               /        |      /        |               |
     |     /               /         |     /         |               |
     |    /               /          |    /          |               |
     |   /               /           |   /           |               |
     |  /               /            |  /            |               |
     | /               /             | /             |               |
     |/               /              |/              |               |
    (F)             (G)-------------(H)-------------(I)             (J)
```

Compute the connected components of the graph using the depth-first search algorithm.

```
Give the sequence of values in the id[] array for the vertices A through J.

       v    A  B  C  D  E  F  G  H  I  J
    -----------------------------------
    id[v]
```

You entered:

0 0 1 1 2 0 1 1 1 2

Your Answer		Score	Explanation
0 0 1 1 2 0 1 1 1 2	✓	1.00	
Total		1.00 / 1.00	

Question Explanation

The correct answer is:

```
0 0 1 1 2 0 1 1 1 2
```

```
   v    A  B  C  D  E  F  G  H  I  J
-----------------------------------
id[v]   0  0  1  1  2  0  1  1  1  2

Here is a trace of the depth-first search:



connected component 0
```

```
---------------------
dfs(A)
  dfs(B)
    check A
    dfs(F)
      check B
      check A
    F done
  B done
  check F
A done
---------------------

check B

connected component 1
---------------------
dfs(C)
  dfs(D)
    check C
    dfs(H)
      check C
      check D
      dfs(I)
        check H
        check D
      I done
      dfs(G)
        check C
        check H
      G done
    H done
    check I
  D done
  check H
  check G
C done
---------------------

check D

connected component 2
---------------------
dfs(E)
  dfs(J)
    check E
  J done
E done
---------------------

check F
check G
check H
check I
check J
```