ECE368 Fall2016 Homework #10

IMPORTANT: Do NOT leave your name or Purdue ID on this homework.

"In signing this statement, I hereby certify that the work on this exercise is my own and that I have not copied the work of any other student while completing it. I understand that, if I fail to honor this agreement, I will receive a score of ZERO for this exercise and will be subject to possible disciplinary action."

```
Homework security number:
```

Please acknowledge those people who have helped you with this homework.

| # of Question	Credits

1. **DFS (30 points)**. Show how *depth-first search* (see our lecture slide) works on the following graph. Assume that the Visit() procedure considers all neighbors of a given vertex in alphabetic order. Follow the example on the slides to show the steps of discovering every vertex. In each step: mark the current vertex; mark vertices whose neighbors have all been considered; illustrate the *stack S*.

    The search starts from vertex q.
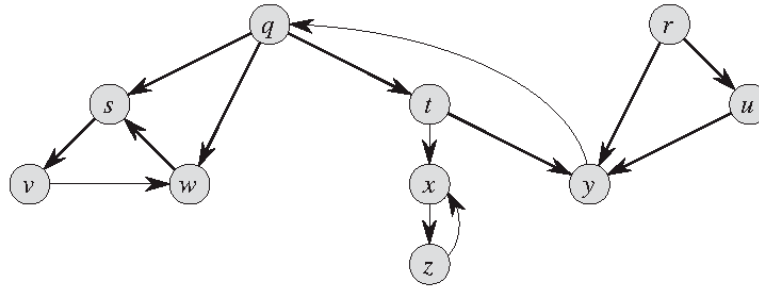
2. **BFS (30 points)**. Show how *breadth-first search* (see our lecture slide) works on the following graph. Assume that the Visit() procedure considers all neighbors of a given vertex in alphabetic order. Follow the example on the slides to show the steps of discovering every vertex. In each step: mark the current vertex; mark vertices whose neighbors have all been considered; illustrate the *queue Q*.

The search starts from vertex *q*.
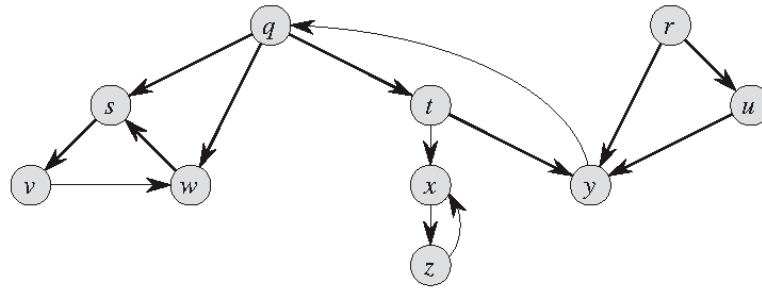
3. **Graph representation (20 points)**. Given an adjacency-list representation of a directed graph (assuming each list header stores the length of the list), how long does it take to compute the out-degree of every vertex? How long does it take to compute the in-degrees? Write down your answers in terms of $|E|$ and $|V|$.

4. **Graph representation (20 points).** Write an adjacency-list representation for a complete binary tree on 7 vertices. Write an equivalent adjacency-matrix representation. Assume that vertices are numbered from 1 to 7 as in a binary heap.