

**Homework Set 2**  
**CSCI 204.01**  
**Prof Meng**

Assigned: Monday, 03/02/2020  
Due: Monday, 03/16/2020

1. For the given graph of cities represented as Python dictionary, following the algorithm of Depth First Search (stack solution), complete the following tasks.

```
graph = {'A': set(['B', 'C']),  
         'B': set(['A', 'D', 'E', 'F']),  
         'C': set(['A', 'F']),  
         'D': set(['B']),  
         'E': set(['B', 'F']),  
         'F': set(['B', 'C', 'E']),  
         'G': set([])}
```

- a. Draw the diagram represented by the above Python dictionary;
  - b. Demonstrate the algorithm how to find if there is a path between the city of 'A' and 'F' by drawing the changes of the stack;
  - c. Demonstrate the algorithm how to find if there is a path between the city of 'C' and 'E';
  - d. Demonstrate the algorithm how to find if there is a path between the city of 'A' and 'G'.
2. Do the same using the Breadth First Search (queue solution) using the same data.
  3. Write a function using stack ADT called `is_palindrome(s)` that takes a string as the parameter and returns **True** if the string represents a palindrome, **False** otherwise. You can assume all functions in a standard stack ADT are defined for you.
  4. Given a circular queue of capacity of 6 using an array, assuming all other functions are defined,
    - a. Define the two functions `is_full()` and `is_empty()`. You can choose how these two functions are defined.
    - b. Show how the content of the queue evolves when inserting the integers 2, 3, 4, 5, 6 into the queue. When is the queue full? Why?
  5. For each of the following situations, which of these ADTs (1 through 4) would be most appropriate to represent the data: (1) a queue; (2) a stack; (3) a list; (4) none? Briefly explain your answer(s).
    - a. The customers at a deli counter who take numbers to mark their turn
    - b. An alphabetic list of names
    - c. Integers that need to be sorted
    - d. A grocery list ordered by the occurrences of the items in the store
    - e. A list of tasks to be completed in chronological order
    - f. Airplanes that are approaching an airport, waiting to land
    - g. People who are put on hold when they call a travel agency to make hotel reservations
    - h. A collection of papers submitted by students that needs to be graded, facing up (i.e., the cover page is facing up)