CS:1210 Practice Problem Set 11  
Complete before Tuesday, 4-21-2015

These practice problems are based on the program that plays the word ladders game. This is called playLaddersGame2.py and is posted on the course website.

Consider the network of “words” shown above. Suppose that we call the function searchWordNetwork on this word network with source “A” and target “D”.

1. Show the contents of the reached dictionary and the processed dictionary at the beginning of each iteration of the while-loop in searchWordNetwork. Assume that (i) the list of neighbors of each node is in alphabetical order and (ii) each time we pull an element out of reached using popitem(), we get the element that is alphabetically largest.

2. Following up on Problem 1, show the contents of the processed dictionary, when it is returned from searchWordNetwork.

3. Solve Problem 1 again, but now assume that (i) the list of neighbors of each node is in alphabetical order and (ii) each time we pull an element out of reached using popitem(), we get the element that was inserted earliest into reached. The implication of assumption (i) is that the for-loops in the function that walk through neighbors will do so in alphabetical order.

4. Following up on Problem 3, show the contents of the processed dictionary, when it is returned from searchWordNetwork.

5. This question is about the fibonacci function shown below.

```python
def fibonacci(n):
    if n == 1 or n == 2:
        return 1
    answer = fibonacci(n-1) + fibonacci(n-2)
    return answer
```

(a) Here is a picture that shows all the function calls that are made when we call fibonacci(4). Specifically, the picture shows the parameters being sent into each function call (next to each arrow) and also the order in which the functions are called (inside each circle). Draw a larger version of this picture for fibonacci(6). Each circle
(b) What output does the function produce, if we insert a print n statement as the very first line of the function and call fibonacci(6). You should solve the problem by hand and not by running this function on a computer.

(c) What output does the function produce, if we insert a print n statement as the second-last line of the function (just above the return statement) and call fibonacci(6). You should solve the problem by hand and not by running this function on a computer.

6. Consider the recursive implementation of the function power that we discussed in class (see posted code).

(a) What output does the function produce, if we insert a print n statement as the very first line of the function and execute the function call power(2, 573).

(b) How many multiplications are performed by the function when we make the function call power(3, 33)?