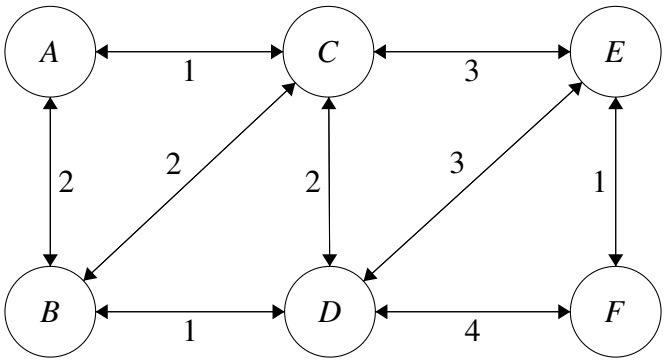
CS 61B Fall 2014 MSTs and Dynamic Programming

1 Minimum Spanning Trees



a) Perform Prim's algorithm to find the minimum spanning tree of the following graph. Pick A as the initial node. Whenever there are more than one node with the same cost, process them in alphabetical order.

b) Use Kruskal's algorithm to find a minimum spanning tree.

c) Bonus! There are quite a few MSTs here. How many can you find?

2 Dynamic Programming: Fibonacci

a) Write a recursive memoized version of the Fibonacci function. As a reminder, fib(n) = fib(n-1) + fib(n-2). fib(0) = 0 and fib(1) = 1. Hint: You may want to define a helper function

```
public static int fib(int n) {

}
```

b) What is the running time of your method?

3 Dynamic Programming: Maximum Subarray

You are given an array of integers, A. Find the subarray with the maximum sum. Let's suppose we were given an array containing the elements $\{-2,1,-3,4,-1,2,1,-5,4\}$. The maximum subarray is $\{4,-1,2,1\}$ with a sum of 6. Note that the empty subarray is valid, with a sum of 0. For example, given $\{-1,-2,-3\}$, you would return 0 for the subarray $\{\}$

a) Sometimes, we can define a problem in terms of subproblems. What might be an appropriate subproblem for this problem? Hint: If we know the the maximum sum of the array ending at index $i-1$, what do we know about the maximum sum of the array ending at index i?

b) Write an iterative method to solve the problem.

```
public static int maxSubarraySum(int[] A) {

}
```