Sample midterm

1. How to check, in O(V+E), whether there are two paths in an undirected graph from s to t that do not share a vertex other than s or t?

2. Given a collection of coin values and a maximum number of coins that you are allowed to use, give an algorithm to calculate all the possible values you can make. For instance, if you have the coin values 1, 5 and you are allowed to use a maximum of 2 coins, the following values can be made:

1 - 1*1   6 - 5*1 + 1*1
2 - 1*2   10 - 5*2
5 - 5*1

The running time of your algorithm should be O(N*A*V), where:
    -N is the number of coins in the set
    -A is the number of coins you are allowed to use
    -V is the maximum value that can be achieved

3. Give an algorithm to count the number of positive divisors of a positive integer.

a) Give a O(sqrt(n)) time algorithm

b) Give a faster than O(sqrt(n)) algorithm that is allowed to assume that the list of smallest X primes has already been precomputed, for an arbitrary value of X.

4. http://online-judge.uva.es/p/v103/10306.html