Department of Mathematics and Computer Science

2301365 Algorithm Design and Analysis Lab #4

Name _____ Student ID _____

Dynamic Programming

Coin Change Problem: find a number of ways of making changes for a particular amount of money, *N*, using a given set of denominations $d_1 \ldots d_m$ (value of coin)

For example, for N=4, D={1,2,3}, there are four solutions: {1,1,1,1}, {1,1,2}, {2,2},{1,3}

Show the recurrence equation and write a program using a dynamic programming approach to solve this problem.

```
Amount = 5
coins [] = {1,2,3}
Ways to make change = 5
{1,1,1,1,1} {1,1,1,2}, {1,2,2}, {1,1,3} {2,3}
```

The Minimum Coin Change Problem:

From the above problem, extend the solution to find the "minimum" number of coins to make a change.

Show the recurrence equation and write a program using a dynamic programming approach to solve this problem.

```
Amount = 5
coins [] = {1,2,3}
Minimum of Coin is 2
{2,3}
```