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**Homework #5**

**Exercise 1)** (order marked, Distance) for f and g it would depend on how the heap was built. For order.

**Exercise 2)**

1. **Black represents edges that were ignored because they had more than one of its endpoints were in the graph. Red represents the tree path and the numbers are the order the edges were added in.22. The problem asks to start with A but this would be the same as prims we must keep track of a series of disjoint sets adding only the smallest edges to each disjoint tree.**

1

3

2

4

6

5

7

1

3

2

4

6

5

7

**Exercise 3) starting from vertex A**

-2

3

11

-3

7

**Exercise 4)**

Suppose n=40

The greedy algorithm selects the largest available deviser in this case 25

So we get 1) 25 the next greatest devisor is 10 so we get 1) 10 the next greatest devisor is 1 so we get 1)1 the next is the same so we have 2)1 etc till we get 5)1 the total number of coins is 7 but the ompitmal solution is 4)10 where clearly 4<7 the greedy algorithm has failed to find the optimal solution.

**Exercise 5)** n is again 40 this time we want to find the fewest number of coins in <= 40 steps so that the algorithm is O(n) first we tally the frequency that each number occurs in the n so for our numbers

A:1 B:4 c:40 we then make a list containing the frequency of the each nodes \* the node so we have 1 A, 4 D and 40 C. we will use a matrix, with this algorithm row(i) column(j) = optimal # of coins needed at I value to equal

j

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

I 1 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

10 1 2 3 4 5 6 7 8 9 1 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 10 11 3 4 5 6 7 8 9 10 11 12 4

25 1 2 3 4 5 6 7 8 9 1 2 3 4 5 6 7 8 9 10 2 3 4 5 6 1 2 3 4 5 6 7 8 9 2 3 4 5 6 7 8

So the optimal solution is 4