# Homework 5

1. Coin-Row Problem

C = [ 5, 1, 2, 10, 6 ]

F0 = 0, f1 = 5, fi = max (ci + fn-2, fi-1)

i = 2: max (1 + F(0), F(1)) => max (1 , 5) == 5 cents

i = 3: max (2 + F(1), F(2)) => max (7 , 5) == 7 cents

i = 4: max (10 + F(2), F(3)) => max (15 , 7) == 15 cents

i = 5: max (6 + F(3), F(4)) => max (13, 15) == 15 cents

Max change we can get is 15 cents picking the 1st and 4th coins

1. Change-Making Problem (find all solutions)

N=9, C = [ 1, 3, 5 ]

N0 = 0, i 1>n, j 1>m and I > dj, temp = min (n(i-dj), temp)

i = 1: N(i) = temp +1 => 1 coin

j = 1: temp = min(N(i – dj), temp) => min(0 , inf) => 0

j = 2: temp = min(N(i – dj), temp) => min(na , 0) => 0

j = 3: temp = min(N(i – dj), temp) => min(na , 0) => 0

i = 2: N(i) = temp +1 => 2 coins

j = 1: temp = min(N(i – dj), temp) => min(N(1) , inf) => 1

j = 2: temp = min(N(i – dj), temp) => min(na , 1) => 1

j = 3: temp = min(N(i – dj), temp) => min(na , 1) => 1

i = 3: N(i) = temp +1 => 1 coin

j = 1: temp = min(N(i – dj), temp) => min(N(2) , inf) => 2

j = 2: temp = min(N(i – dj), temp) => min(N(0) , 2) => 0

j = 3: temp = min(N(i – dj), temp) => min(na , 0) => 0

i = 4: N(i) = temp +1 => 2 coins

j = 1: temp = min(N(i – dj), temp) => min(N(3) , inf) => 1

j = 2: temp = min(N(i – dj), temp) => min(N(1) , 1) => 1

j = 3: temp = min(N(i – dj), temp) => min(na , 1) => 1

i = 5: N(i) = temp +1 => 1 coin

j = 1: temp = min(N(i – dj), temp) => min(N(4) , inf) => 2

j = 2: temp = min(N(i – dj), temp) => min(N(2) , 2) => 2

j = 3: temp = min(N(i – dj), temp) => min(N(0) , 2) => 0

i = 6: N(i) = temp +1 => 2 coins

j = 1: temp = min(N(i – dj), temp) => min(N(5) , inf) => 1

j = 2: temp = min(N(i – dj), temp) => min(N(3) , 1) => 1

j = 3: temp = min(N(i – dj), temp) => min(N(1) , 1) => 1

i = 7: N(i) = temp +1 => 3 coins

j = 1: temp = min(N(i – dj), temp) => min(N(6) , inf) => 2

j = 2: temp = min(N(i – dj), temp) => min(N(4) , 2) => 2

j = 3: temp = min(N(i – dj), temp) => min(N(2) , 2) => 2

i = 8: N(i) = temp +1 => 2 coins

j = 1: temp = min(N(i – dj), temp) => min(N(7) , inf) => 3

j = 2: temp = min(N(i – dj), temp) => min(N(5) , 3) => 1

j = 3: temp = min(N(i – dj), temp) => min(N(3) , 1) => 1

i = 9: N(i) = temp +1 => 3

j = 1: temp = min(N(i – dj), temp) => min(N(8) , inf) => 2

j = 2: temp = min(N(i – dj), temp) => min(N(6) , 2) => 2

j = 3: temp = min(N(i – dj), temp) => min(N(4) , 2) => 2

Answer: it will take 3 coins for 9 cents back

1. Coin-Collecting Problem
   1. In words, how is different from book?
   2. Adjust pseudo code to follow new rule
   3. Use to solve example and fill out two grids
2. Knapsack (bottom-up DP)
3. Optimal Binary Search Trees
4. Warshall’s algo
5. Floyd’s algo
6. Edit Distance Problem
   1. Cange letter
   2. Insert letter
   3. Delete letter
7. Develop word distance
   1. Pseudo code
   2. Best/Worst cases
   3. Build or explain in detail