CA318
Labsheet #5

Question 1

Consider the problem of **making change** using coins as seen in the lecture. Use the algorithm from class to solve this problem:

A = 11, C = { 1, 5, 6, 8 }

Solution

	0	1	2	3	4	5	6	7	8	9	10	11
0	0	I	I	I	I	I	I	I	I	I	I	I
1	0	1	2	3	4	5	6	7	8	9	10	11
5	0	1	2	3	4	1	2	3	4	5	2	3
6	0	1	2	3	4	1	1	2	3	4	2	2
8	0	1	2	3	4	1	1	2	1	2	2	2

Question 2

Consider the problem of **making change** using coins as seen in the lecture. Use the algorithm from class to solve this problem:

A = 12, C = { 2, 5, 6, 8 }

Use this table to compute the solution:

	0	1	2	3	4	5	6	7	8	9	10	11	12
0	I	I	I	I	I	I	I	I	I	I	I	I	I
2	0	I	1	I	2	I	3	I	4	I	5	I	6
5	0	I	1	I	2	1	3	2	4	3	2	4	3
6	0	I	1	I	2	1	1	2	2	3	2	2	2
8	0	I	1	I	2	1	1	2	1	3	2	2	2

Question 3

1. Briefly compare the complexity of this algorithm with the Brute Force solution we discussed in class. In your answer derive an estimate of the complexity for each.
    a. BF - exhaustive search on a graph where b=2 ⇒ $\Theta(2^n)$
    b. DP - mn table search => $m\Theta(n)$
2. Do they both find the optimal solution if one exists?
    a. yes
3. Give an example where the greedy algorithm fails to find **any** solution even though an optimal one exists.
    a. EG: A = { 6 } C = { 2, 3, 5 }
    b. Here, greedy performs as follows
        i. 6 - 5 = 1 { 5, }
        ii. 1 - ?? = { 5, ERROR }