



# ASSIGNMENT D4

Combinatorial Algorithms for CS4B

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**Assignment Code:** After implementing all the assignment I pushed my code on my [Github](#) link.

### **Answer to the question no. 1**

The implementation is done in Qustion1.py file.

### **Answer to the question no. 2**

After running the code, the following output is found:

```
C:\Users\DELL\Desktop\Winter 2021-2022\Computer Science for Big data\csfb-wise2122\
cost_constraint: 9, b/c: 0/0, solution: []
cost_constraint: 10, b/c: 50/10, solution: [0]
cost_constraint: 20, b/c: 80/20, solution: [0, 2]
cost_constraint: 30, b/c: 120/30, solution: [7]
cost_constraint: 40, b/c: 170/40, solution: [0, 7]
cost_constraint: 50, b/c: 200/50, solution: [0, 2, 7]
cost_constraint: 60, b/c: 230/60, solution: [0, 2, 7, 8]
cost_constraint: 100, b/c: 290/100, solution: [0, 2, 5, 6, 7, 8]
cost_constraint: 150, b/c: 350/150, solution: [0, 2, 5, 6, 7, 8, 9, 10]
cost_constraint: 200, b/c: 375/170, solution: [0, 1, 2, 5, 6, 7, 8, 9, 10]
cost_constraint: 1000, b/c: 420/310, solution: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
```

### **Answer to the question no. 3**

**Optimized total beefit:** Choose a sequence which has maximum benefits under the given cost costraint.

**Optimal total cost:** Get the sequence which has maximum benefits and also minimum cost within a certain cost constraint.

### **Answer to the question no. 4**

The code of this question is implemented in Question\_5.py file. The optimal solution under cost constaint of 200 is given bellow:

a) **Total benefit:** 580

b) **Total Cost:** 200

c) **Task arrangement:** [0, 2, 5, 6, 7, 8, 13, 14, 15, 16, 17]

### **Answer to the question no. 5**

When uncommented the last two task and run the code, the execution took much time then before. Because of,

1. Now there are 20 item so all possible combination become  $2^{20} = 1,048,576 > 1 \text{ M.}$
2. For 18 items,  $2^{18} = 262,144$ . So, total number of operation increase almost 4 times.

### **Answer to the question no. 6**

For 20 tasks total solution space become,  $2^{20} = 1,048,576$ .

For 11 tasks total solution space become,  $2^{11} = 2048$ .

So, the expansion become:  $(1,048,576 - 2048) = 1046528 > 1\text{M.}$