

### Problem 1

You are in-charge of managing an investment portfolio and have a specific amount of money to invest  $b$ . You can invest in a variety of assets with different expected returns. Each asset is available in limited numbers. If an asset ' $i$ ' is held for ' $t$ ' months, it will have a return of  $c_i r_i t$ , where  $c_i$  is the cost of buying  $i^{th}$  asset and  $r_i$  is the expected return after  $t$  months. Also, you can **buy only one asset in each month**. Your goal is to determine the allocation of your investment across the various assets so that the expected returns is maximized.

The following things are given to you:

- $n$  number of assets,
- $c_i$  is the cost of buying one  $i^{th}$  asset,
- $q_i$  is the amount of  $i^{th}$  asset available,
- $r_i$  is the expected return of  $i^{th}$  asset after ' $t$ ' months.
- Maximum allocated budget:  $b$

Print the maximum returns after ' $t$ ' months.

**Test case:**

Asset ( $i$ )	Cost ( $c_i$ )	Quantity ( $q_i$ )	Returns ( $r_i$ )
1	20	5	1.5
2	50	2	1.8
3	10	4	2.1
4	30	3	1.1
5	20	2	0.5

Allocated budget: **Rs. 300** and  $t = 12$

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### Problem 2

Suppose you are given the prices of one share for  $n$  days. This price indicates how much you need to pay if buy the share on that day and how much you will get if you sell the share on that day. You are allowed to make at most  $n/2$  purchase and at most  $n/2$  sale of this item, and you cannot sell before you buy. You'd like to find the maximum profit that can be made by buying and selling this share.

**Test case:**

Day	1	2	3	4	5	6	7	8	9	10
Price	10	15	7	20	5	25	30	12	18	22
1 <sup>st</sup> purchase and sale: Buy on Day 5 sell on Day 7 => Profit (30 - 5 = 25)										
Day	1	2	3	4		6		8	9	10
Price	10	15	7	20		25		12	18	22
2 <sup>nd</sup> purchase and sale: Buy on Day 3 sell on Day 6 => Profit (25 - 7 = 18)										
Day	1	2		4				8	9	10
Price	10	15		20				12	18	22
3 <sup>rd</sup> purchase and sale: Buy on Day 1 sell on Day 10 => Profit (22 - 10 = 12)										
Day		2		4				8	9	
Price		15		20				12	18	
4 <sup>th</sup> purchase and sale: Buy on Day 8 sell on Day 9 => Profit (18 - 12 = 6)										
Day		2		4						
Price		15		20						
5 <sup>th</sup> purchase and sale: Buy on Day 2 sell on Day 4 => Profit (20 - 15 = 5)										

Maximum profit is: 25 + 18 + 12 + 6 + 5 = 66