Shaan ul Haque(180070053)
Parth Dodhia (180070041)
Aseer Israr (18D070040)
Garaga V V S Krishna Vamsi (180070020

1 Generation of Datasets

The datasets were generated randomly using the inbuilt random integer generator function. We tested on a total of 11 test cases one test case having large values of parameters.

2 Observation

We observed that linear programming takes much less time than dynamic programming on datasets having unusually large numbers for parameters. Time taken for some of the test cases by both the programs are shown below. (order of input same as given in question)

- 4
  1 1 1 2
  949 822
  1781 1
  1 641
  1680
  Output: 80376.0

- 2
  2 2
  26 34 577
  728 2
  26 225
  1454
  Output: 16731.0

- 1
  1
  77 93 54
  1235 1
  27 1587
  864
  Output: 12407.0

- 4
  1 0 1 0
  77 777 973
  1153 2
  37 405
  1581
  Output: 139065.0

- 16
  4 7 20 12 14 13 20 9 14 7 14 10 6 14 1 11
  86 791 607
  841 48
  1236 878
  714
  Output: 375100.0

Test Case	LP	DP(without O2)	DP(with O2)
1	0.01797s	0.17757s	0.040594s
2	0.01600s	0.0229607s	0.004424s
3	0.01674s	0.0010075s	0s
4	0.03055s	7.08957s	0.789561s
5	0.79188s	∞	∞

∞ - Did not compile

We observe that for cases where number of months is 1 or 2(very less) DP is much faster than LP but as the size of the test cases increases LP takes the lead.

An intuitive explanation for this could be that for large numbers matrix size grows very rapidly due to multiplicative terms. **For all DP program we used the O2 optimization to reduce the time taken by code** but still found LP to give results much faster as shown in the above test cases.