

A problem of controlling your bank account. (discussed in class)

The state of your bank account is the amount of money in the account in units of 1000 rupees. Assume that the maximum and minimum amount of money that you can have is 10000 and -10000 (or 10 and -10 in units of 1000 Rs).

Every month, you are allowed to deposit or withdraw 0, 1000 or 2000 Rs.

Every month, you earn a reward which is a function of the amount of money that you have in the bank and the amount that you have deposited or withdrawn.

Suppose  $s_t$  is the amount of money in the bank and  $A_t$  is the amount that was deposited or withdrawn at time  $t$ , then the reward  $R_t(s_t, A_t)$  is defined as

$$R_t(s_t, A_t) = \frac{1}{(t+1)^\gamma} |A_t| \cdot \mathbb{I}\{A_t < 0\} + \alpha^t s_t \mathbb{I}\{s_t > 0\}$$

Where  $\mathbb{I}$  is the indicator function. and  $\alpha > 1$ ,  $\gamma > 1$   
for  $\alpha = 1.2$ , ~~solve the~~ and  $\gamma = 1.2$  solve the problem

$$\max_{A_0, \dots, A_4} \sum_{t=0}^4 R_t(s_t, A_t) \text{ for } s_0 = 1000 \text{ Rs.}$$

This needs to be solved by first implementing a method to do dynamic programming recursion in Matlab/Python.

The method for doing dynamic programming was discussed using pseudocode in class.