Input Parameters :

N : no of Machine for sale

C : no of dollars at start of Period

D : Planning Period

D_i : day on which the M/c is for Sale

P_i : Purchasing Price

R_i : Reselling Price

G_i : Profit Per day

Problem approach

a. I have created a network with sink and source including N (no of M/c) with ascending order day of availability of M/c.

b. let suppose source is a virtual M/c with

$D\_source = 0$

$P\_source = 0$

$R\_source = 0$

$G\_source = 0$

c. Let suppose sink is a virtual M/c with

$D\_sink = D+1$

$P\_sink = 0$

$R\_sink = 0$

$G\_sink = 0$

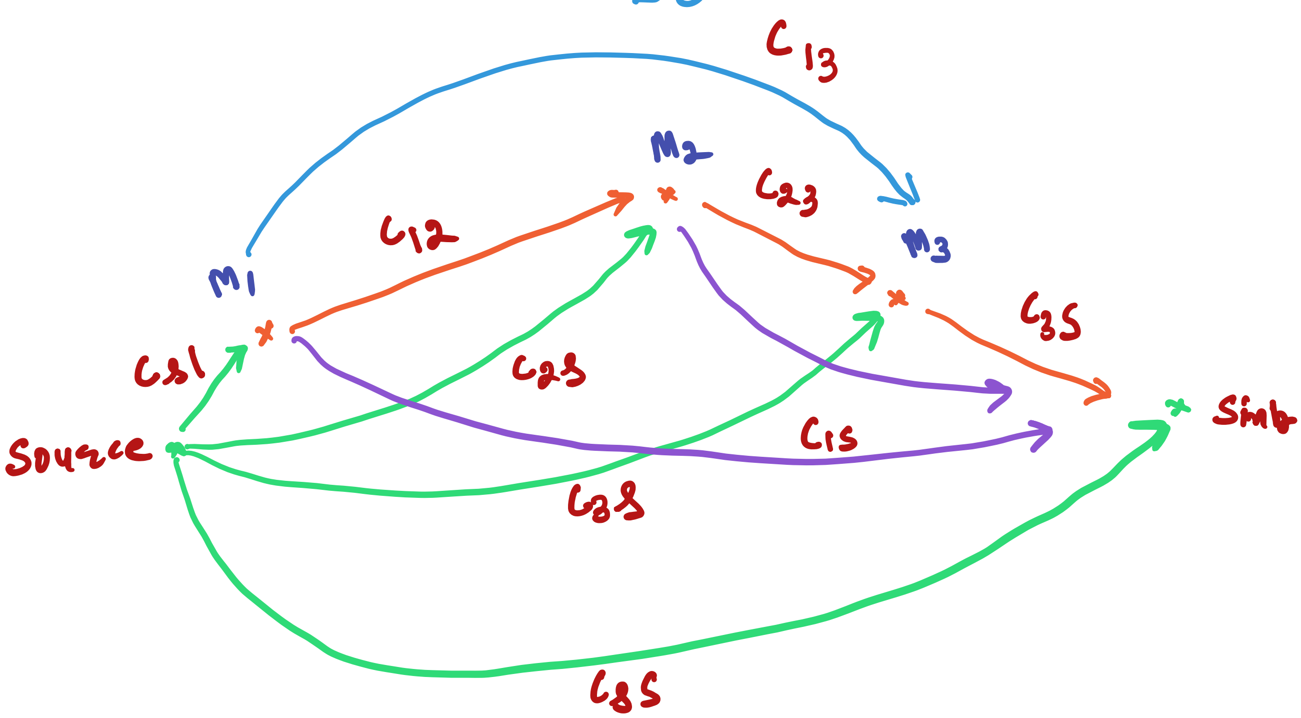


fig. (1)

d. calculations of c_{ij}

(i) when i = source and $j = 1 \ldots\ldots N$

$$c_{sj} = C - P_j$$

[C = Initial dollar
P_j = Purchasing Price of j^{th} M/c]

(ii) when $i, j \in [1 \ldots\ldots N]$ and $i < j$

$$c_{ij} = C - P_i + R_i + \max(D_j - D_i - 1, 0) * G_i - P_j$$

(iii) when $i = 1 \ldots\ldots N$ and j = Sink

$$c_{i\,sink} = C - P_i + R_i + (D - D_i) * G_i$$

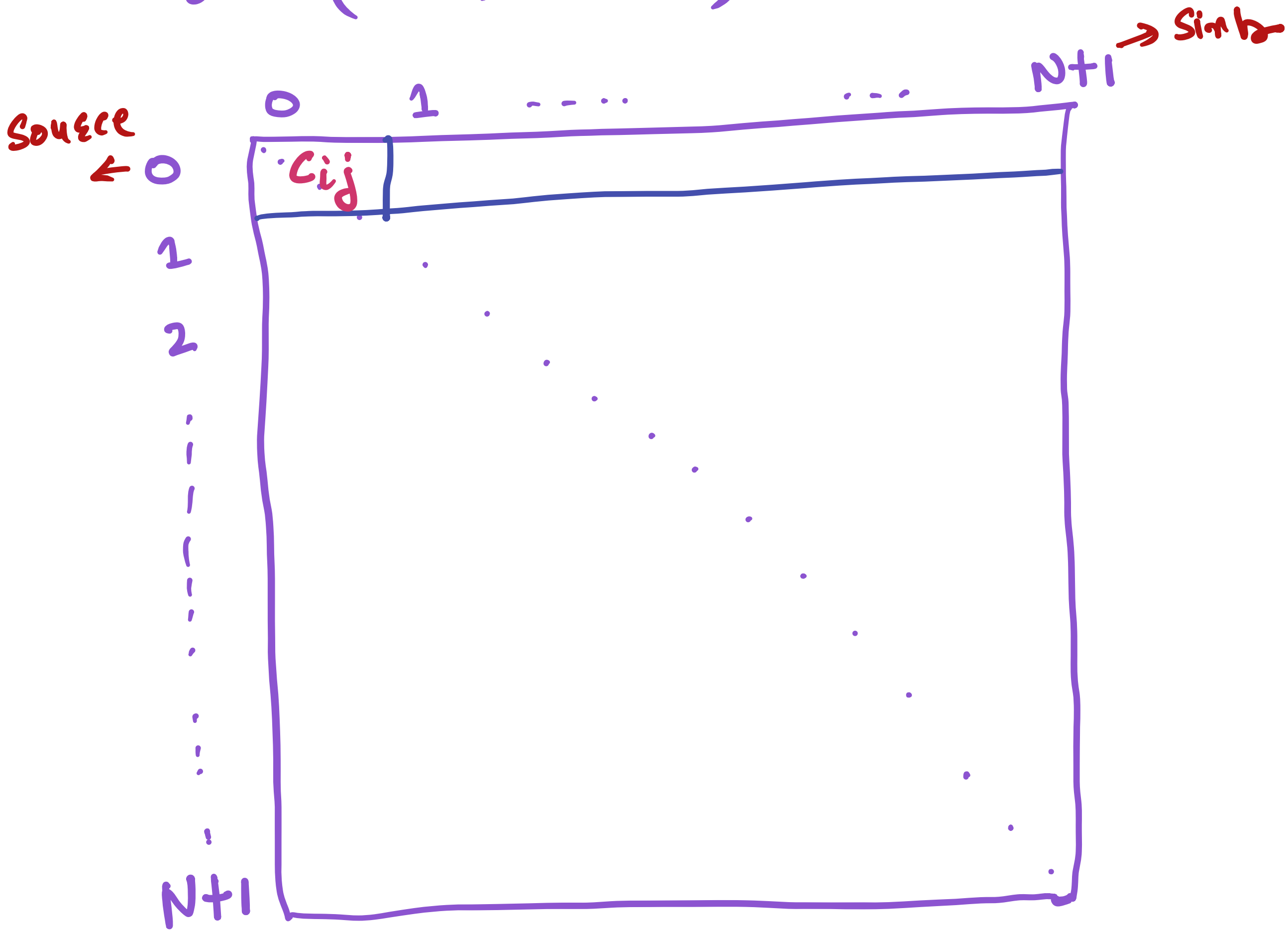
(iv) when i = source, j = Sink

$$c_{source,sink} = C$$

(v) when $i \geq j$

$$c_{ij} = -10000$$

Now we have a Matrix of Size (N+2, N+2)



Model formulation

$$obj\ z = Max \sum\sum c_{ij} \cdot x_{ij}$$

OR

$$obj\ z = -\left[minimize \sum\sum(-c_{ij}).x_{ij}\right]$$

$$x_{ij} = [0,1]$$

Subject to :-

$$\sum_j x_{ij} - \sum_j x_{ji} = \begin{cases} 1 & if\ i = 0 \\ -1 & if\ i = N+1 \\ 0 & otherwise \end{cases}$$

* Above formulation become shorest Path problem between source and Sink.

Solution strategy.

1. we have a directed graph with negative/positive weights on the edges with single source.

2. I'm choosing Floyd-Warshall algo for solving this problem.