



This answer was provided by CS Place, click [here](#) to join the Discord.

Question:

i / j	1	2	3	4	5	6	7
1	1	0	0	0	0	0	-47
2	0	12	0	0	0	-20	0
3	0	0	45	0	29	0	0
4	0	0	0	112	0	0	0
5	0	0	241	0	225	0	0
6	0	428	0	0	0	396	0
7	685	0	0	0	0	0	637

Given is the above matrix  $m$ . In order to represent  $m$  most efficiently (allocating minimum amount of memory space)) provide **a partial function formula** (NOT code!!!) in terms of  $i$  and  $j$ . You can use the partial function formula I provided for you below.

$m_{i,j} = \left\{ \begin{array}{ll} & \text{for} \\ & \text{for} \end{array} \right.$

Answer:

Given Matrix is

i / j	1	2	3	4	5	6	7
1	1	0	0	0	0	0	-47
2	0	12	0	0	0	-20	0
3	0	0	45	0	29	0	0
4	0	0	0	112	0	0	0
5	0	0	241	0	225	0	0
6	0	428	0	0	0	396	0
7	685	0	0	0	0	0	637

Partial function formula to get the above matrix is

$$m_{i,j} = \left\{ \begin{array}{ll} 2 \cdot (i)^3 - j^2 & \text{for } i=j \text{ or } i+j=8 \\ 0 & \text{for } i \neq j \text{ and } i+j \neq 8 \end{array} \right.$$

$m_{i,j} = 2(i)^3 - j^2$       How  $i=j$

$m_{1,1} = 2 \cdot (1)^3 - 1^2 = 2(1) - 1 = 2 - 1 = 1$

$$\begin{aligned}
 m_{2,2} &= 2 \cdot (2)^3 - 2^2 = 2(8) - 4 = 16 - 4 = 12 \\
 m_{3,3} &= 2 \cdot (3)^3 - 3^2 = 2(27) - 9 = 54 - 9 = 45 \\
 m_{4,4} &= 2 \cdot (4)^3 - 4^2 = 2(64) - 16 = 128 - 16 = 112 \\
 m_{5,5} &= 2 \cdot (5)^3 - 5^2 = 2(125) - 25 = 250 - 25 = 225 \\
 m_{6,6} &= 2 \cdot (6)^3 - 6^2 = 2(216) - 36 = 432 - 36 = 396 \\
 m_{7,7} &= 2 \cdot (7)^3 - 7^2 = 2(343) - 49 = 686 - 49 = 637
 \end{aligned}$$

$$\underline{m_{ij} = 2(i)^3 - j^2 \quad \text{for } i+j=8}$$

$$\begin{aligned}
 m_{1,7} &= 2(1)^3 - 7^2 = 2(1) - 49 = 2 - 49 = -47 \\
 m_{2,6} &= 2(2)^3 - 6^2 = 2(8) - 36 = 16 - 36 = -20 \\
 m_{3,5} &= 2(3)^3 - 5^2 = 2(27) - 25 = 54 - 25 = 29 \\
 m_{4,4} &= 2(4)^3 - 4^2 = 2(64) - 16 = 128 - 16 = 112 \\
 m_{5,3} &= 2(5)^3 - 3^2 = 2(125) - 9 = 250 - 9 = 241 \\
 m_{6,2} &= 2(6)^3 - 2^2 = 2(216) - 4 = 432 - 4 = 428 \\
 m_{7,1} &= 2(7)^3 - 1^2 = 2(343) - 1 = 686 - 1 = 685
 \end{aligned}$$

$$\underline{m_{ij} = 0 \quad \text{for} \quad i \neq j \quad \text{and} \quad i+j \neq 8}$$

Ex:  $m_{2,3} = 0$

Here 2 and 3 are not equal  $2 \neq 3$

$2 + 3 = 5 \therefore$  Not equal to 8

The corresponding  $m_{2,3} = 0$