Approach to ques

0 Ques note

1 Logic only ✓

X How you code??

Matrix Multiplication (16 July)

logic

↳ Pseudo code

3 Code

4 dry run on Code

Matrix Multiplication (16 July)

2×3

$$a = \begin{matrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \end{matrix}$$

$m_1 n_1$

3×4

$$b = \begin{matrix} b_{11} & b_{12} & b_{13} & b_{14} \\ b_{21} & b_{22} & b_{23} & b_{24} \\ b_{31} & b_{32} & b_{33} & b_{34} \end{matrix}$$

$m_2 n_2$

$n_1 == m_2 \rightarrow$ valid

$n \neq m_2 \rightarrow$ not valid

O/P matrix $\Rightarrow 2 \times 4 = m_1 \times n_2$

2×3

$$a = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \end{bmatrix}$$

$m_1 n_1$

3×4

$$b = \begin{bmatrix} b_{11} & b_{12} & b_{13} & b_{14} \\ b_{21} & b_{22} & b_{23} & b_{24} \\ b_{31} & b_{32} & b_{33} & b_{34} \end{bmatrix}$$

$m_2 n_2$

$$c = a \times b = \begin{bmatrix} c_{11} & c_{12} & c_{13} & c_{14} \\ c_{21} & c_{22} & c_{23} & c_{24} \end{bmatrix}$$

2×4

$$c_{11} = a_{11} \cdot b_{11} + a_{12} \cdot b_{21} + a_{13} \cdot b_{31}$$

$$\rightarrow c_{12} = a_{11} b_{12} + a_{12} b_{22} + a_{13} b_{32}$$

1 2 3

$$c_{14} = a_{11} \cdot b_{14} + a_{12} \cdot b_{24} + a_{13} \, b_{34}$$

row of a → const & col of b → const

Printing

```java
// for each
for (int[] rowArr: c) {
    for (int val: rowArr) {
        System.out.print(val + " ");
    }
    System.out.println();
}
```

	0	1	2	3
c = → 0	c_{11}	c_{12}	c_{13}	c_{14}
→ 1	c_{21}	c_{22}	c_{23}	c_{24}

2d → multiple 1d array

(1) → c_{11} c_{12} c_{13} c_{14}

↓

c_{11}, c_{12}, c_{13}, c_{14}

(2) c_{21} c_{22} c_{23} c_{24}

↓

c_{21}, c_{22}, c_{23}, c_{24}

```
for (int i = 0; i < c.length; i++) {
    for (int j = 0; j < c[i].length; j++) {
        for (int k = 0; k < n1; k++) {
            c[i][j] += (a[i][k] * b[k][j]);
        }
    }
}
```

3

$k = 0, 1, 2$

$$\begin{matrix} c_{00} & c_{01} & c_{02} & c_{03} \\ c_{10} & c_{11} & c_{12} & c_{13} \end{matrix}$$

$$\begin{matrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \end{matrix} \qquad \begin{matrix} b_{11} & b_{12} & b_{13} & b_{14} \\ b_{21} & b_{22} & b_{23} & b_{24} \\ b_{31} & b_{32} & b_{33} & b_{34} \end{matrix}$$

$$c_{00} = \overset{0}{c_{00}} + \overset{a_{11}}{a_{00}} \cdot \overset{b_{11}}{b_{00}} = a_{11} b_{11}$$

$$c_{00} = \overset{a_{11} b_{11}}{c_{00}} + \overset{a_{12}}{a_{01}} \cdot \overset{b_{21}}{b_{01}} \Rightarrow a_{11} b_{11} + a_{12} b_{21}$$

$$c_{00} = c_{00} + a_{02} \cdot b_{02} = a_{11} b_{11} + a_{12} b_{21} + a_{13} b_{31}$$

Transpose of Matrix of N*N (16 july)

$$
\begin{array}{c|c}
 & \begin{matrix} 0 & 1 & 2 & 3 \end{matrix} \\
\begin{matrix} 0 \\ 1 \\ 2 \\ 3 \end{matrix} & a = \begin{bmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \\ a_{41} & a_{42} & a_{43} & a_{44} \end{bmatrix}^{T}_{4\times 4}
\end{array}
$$

$$
a_T = \begin{bmatrix} a_{11} & a_{21} & a_{31} & a_{41} \\ a_{12} & a_{22} & a_{32} & a_{42} \\ a_{13} & a_{23} & a_{33} & a_{43} \\ a_{14} & a_{24} & a_{34} & a_{44} \end{bmatrix}
$$

```
for(i=0; i<n; i++){
  for(j=0; j<i; j++){
    swap(arr, i, j)
}
```

→ Traverse in Lower or upper Traing not any one

$$a = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$$

Swab

$ij \to j$

$\downarrow$ Transpose

$$a^T = \begin{bmatrix} a_{11} & a_{21} & a_{31} \\ a_{12} & a_{22} & a_{32} \\ a_{13} & a_{23} & a_{33} \end{bmatrix}$$

$$
\begin{array}{cc}
i & \\
0 \rightarrow & \\
a \quad i=1 \rightarrow & \\
i=2 \rightarrow &
\end{array}
\begin{bmatrix}
a_{11} & a_{12} & a_{13} \\
a_{21} & a_{22} & a_{23} \\
a_{31} & a_{32} & a_{33}
\end{bmatrix}
$$

Convert 1-D Array to 2-D Array (16 July)

$a = 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8$

$p = 4 \rightarrow$ Row

$q = 2 \rightarrow$ Column

$\rightarrow 4 \times 2 = 8$ elements

$p = 4$

$q = 3$

$4 \times 3 = 12$ X $\rightarrow$ not valid

$$o/p = \begin{matrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \end{matrix}$$

$8 = p \times q$

$p \times q == n \rightarrow$ valid

idx

1 2 3 4 5 6 7 8

p = 4

q = 2

loop in the O/P array

$$p \times q \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \\ a_{31} & a_{32} \\ a_{41} & a_{42} \end{bmatrix} \Rightarrow \begin{matrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \\ 7 & 8 \end{matrix}$$