

① ques note

Approach to ques

① Logic only ✓

X How you code??

Matrix Multiplication (16 July)

—

③

Code

logic

↳

Pseudo code

④

dry run on Code

Matrix Multiplication (16 July)

2×3

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

$m_1 \times n_1$

3×4

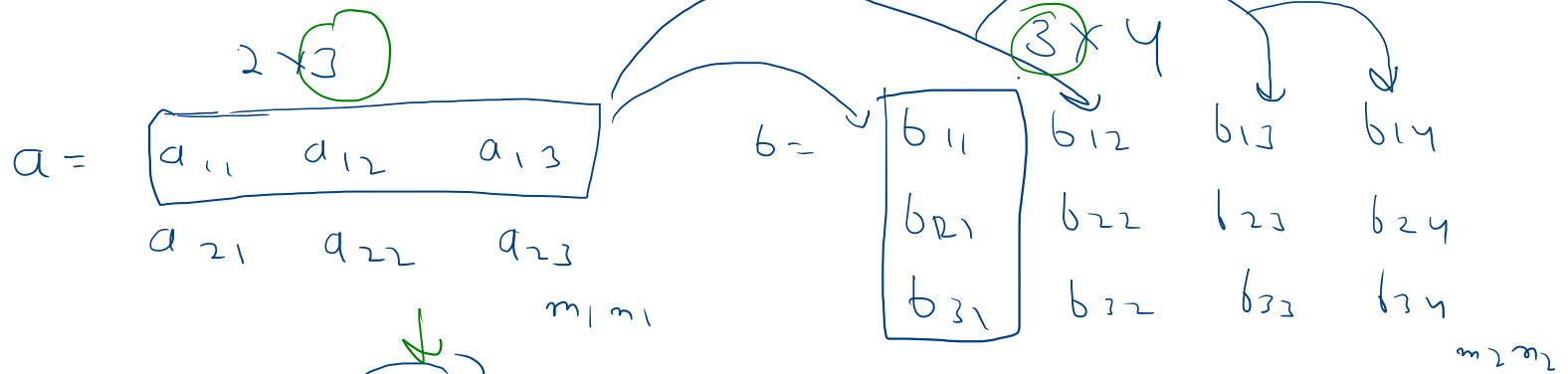
$$b = \begin{matrix} & b_{11} & b_{12} & b_{13} & b_{14} \\ b_{21} & b_{22} & b_{23} & b_{24} \\ b_{31} & b_{32} & b_{33} & b_{34} \end{matrix}$$

$m_2 \times n_2$

$$n_1 = n_2 \rightarrow \text{valid}$$

$$n_1 \neq n_2 \rightarrow \text{not valid}$$

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



$c = a \times b =$

Matrix c is 2×4 (dimensions $m_1 \times n_2$).

Elements of c are $c_{11}, c_{12}, c_{13}, c_{14}$ and $c_{21}, c_{22}, c_{23}, c_{24}$.

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

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

Diagram illustrating the calculation of c_{14} :

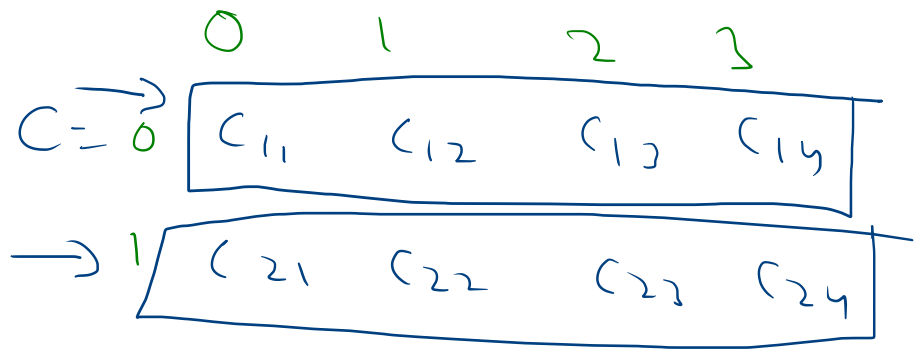
$c_{14} = a_{11} \cdot b_{14} + a_{12} \cdot b_{24} + a_{13} \cdot b_{34}$

Row of $a \rightarrow \text{const}$ (for a_{11}, a_{12}, a_{13})

Col of $b \rightarrow \text{const}$ (for b_{14}, b_{24}, b_{34})

Printing

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



2d → multiple id wrong

① → C₁₁ C₁₂ C₁₃ C₁₄
↓
C₁₁, C₁₂, C₁₃, C₁₄

② C₂₁ C₂₂ C₂₃ C₂₄
↓
C₂₁, C₂₂, C₂₃, C₂₄

```

for (int i = 0; i < c.length; i++) {
    for (int j = 0; j < c[i].length; j++) {
        for (int k = 0; k < n3; k++) {
            c[i][j] += (a[i][k] * b[k][j]);
        }
    }
}

```

$k = 0, 1, 2$

$\rightarrow c_{00}$ c_{01} c_{02} c_{03}
 ~~c_{10}~~ ~~c_{11}~~ ~~c_{12}~~ ~~c_{13}~~

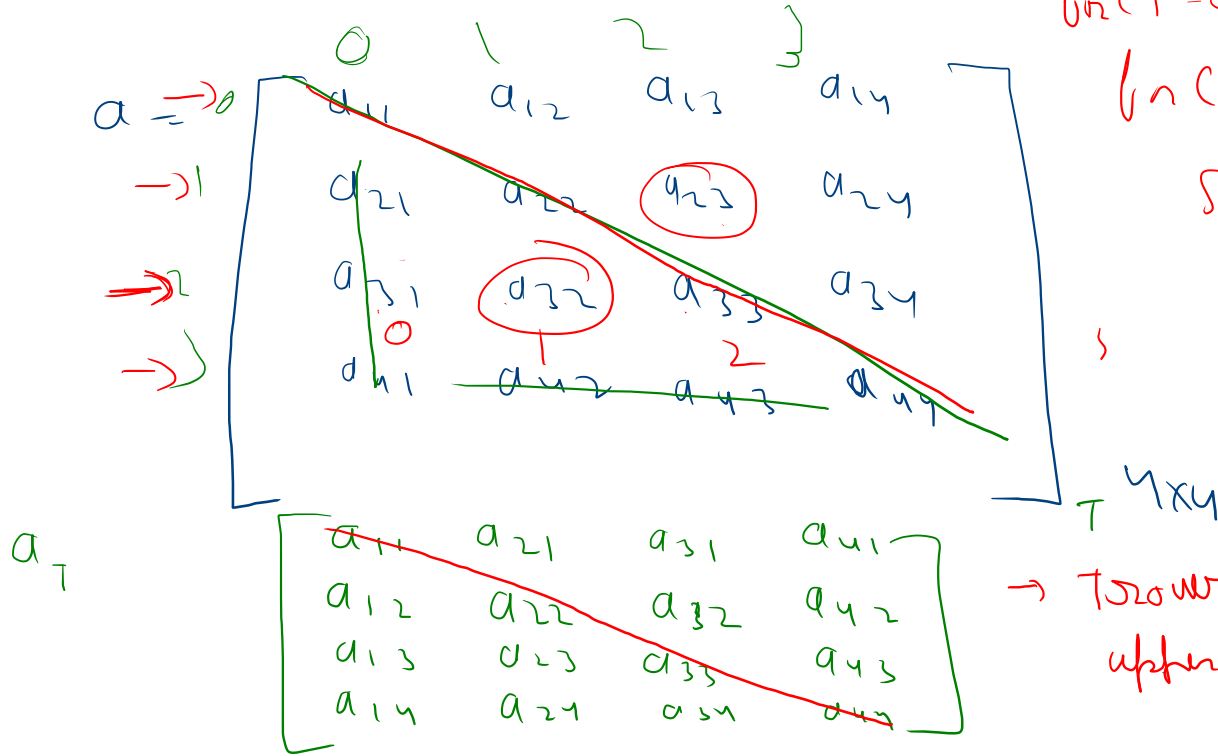
a_{11}	a_{12}	a_{13}
----------	----------	----------

a_{21} a_{22} a_{23}

b_{11}	b_{12}	b_{13}	b_{14}
b_{21}	b_{22}	b_{23}	b_{24}
b_{31}	b_{32}	b_{33}	b_{34}

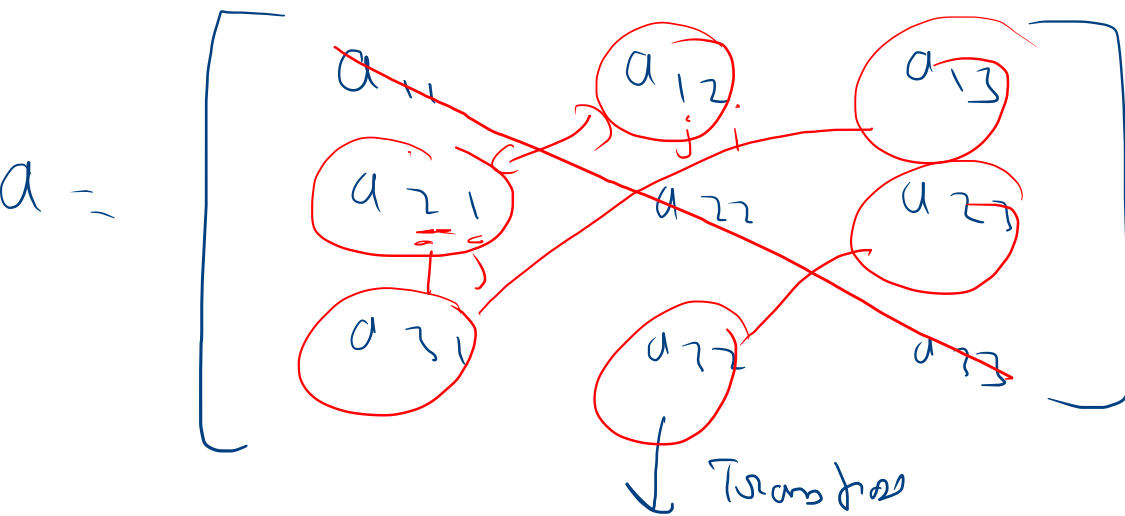
$$\begin{aligned}
 c_{00} &= \cancel{c_{00}} + a_{00} \cdot b_{00} = a_{00} b_{00} \\
 c_{00} &= \cancel{c_{00}} + a_{01} \cdot b_{01} = a_{00} b_{00} + a_{01} b_{01} \\
 c_{00} &= \cancel{c_{00}} + a_{02} \cdot b_{02} = a_{00} b_{00} + a_{01} b_{01} + a_{02} b_{02}
 \end{aligned}$$

Transpose of Matrix of N*N (16 july)



for $i=0; i < n; i++$ {
 for $j=0; j < i; j++$ {
 swap($a[i][j], a[j][i]$)
 }

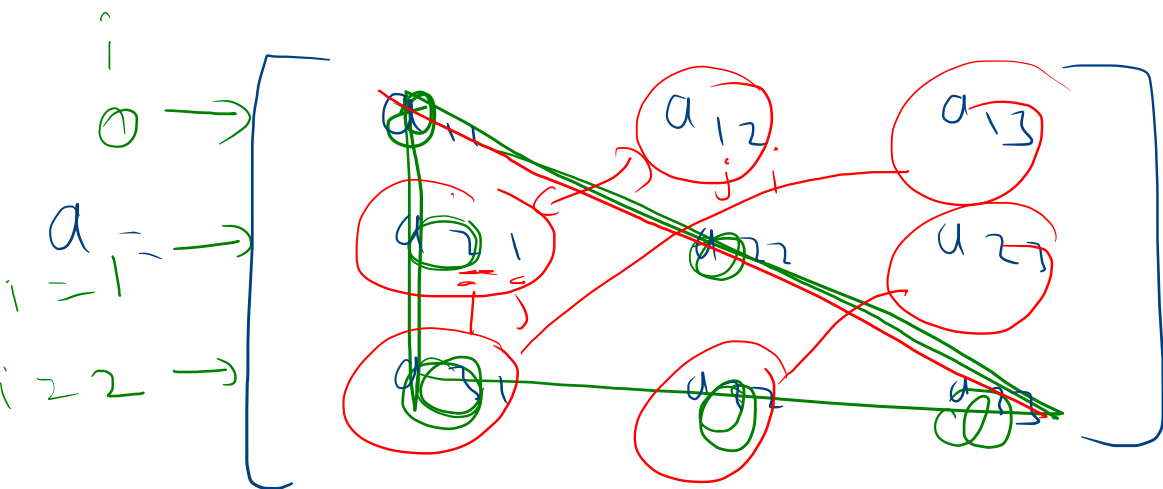
→ Transpose in lower or upper triangular mat any one



Such
 $j \rightarrow i$

$a^T =$

Diagram illustrating the transposed matrix a^T . The elements are $a_{11}, a_{21}, a_{31}, a_{12}, a_{22}, a_{32}, a_{13}, a_{23}, a_{33}$. A red line crosses out the first row and third column.



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

✓ a = 1 2 3 4 5 6 7 8 ↙

p = 4 → Row
q = 2 → Column → $4 \times 2 = 8$ elements

O/p =

1	2	3	4
5	6	7	8

p = 4
q = 3

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

$$8 = p \times q$$

$p \times q = 8 \rightarrow$ valid

1 2 3 4 5 6 7 8

↓

$p=7$
 $q=2$
 ↓
 loop in the o/p array

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