* Matrix multiplication :-

m_1

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}_{2\times 3} \qquad \begin{bmatrix} 1 & 1 \\ 1 & 2 \\ 2 & 1 \end{bmatrix}_{3\times 2}$$ m_2

→ Matrix multiplication is only possible when cols (m_1) = rows (m_2)

→ Output matrix dimensions = [rows (m_1), cols (m_2)]

$$\text{Output} = \begin{bmatrix} (1\times1 + 2\times1 + 3\times2) & (1\times1 + 2\times2 + 3\times1) \\ (4\times1 + 5\times1 + 6\times2) & (4\times1 + 5\times2 + 6\times1) \end{bmatrix} = \begin{bmatrix} (1+2+6) & (1+4+3) \\ (4+5+12) & (4+10+6) \end{bmatrix}$$

$$\begin{bmatrix} 9 & 8 \\ 21 & 20 \end{bmatrix}_{2\times 2}$$ 11

```
if (matrix1[0].length != matrix2.length) {
    // Multiplication not possible
    return;
}

int[][] result = new int[matrix1.length][matrix2[0].length];
for (int i=0; i< matrix1.length; i++) {
   for (int j=0; j < matrix2[0].length; j++) {
       int sum = 0;
```

We are doing 3 multiplications each time. This is equal to C1 (cols of matrix 1)

```
       for (int k=0; k < matrix1[0].length; k++) {
           int value = matrix1[i][k] * matrix2[k][j];
           sum += value;
       }
       result[i][j] = sum;
   }
}
```