

## 4 x 4 Matrix multiplication.

1	6	4	5
4	-4	8	6
4	-4	8	7
4	-4	8	-9

2	-6	9	-4
4	5	-1	-3
4	5	-1	7
4	-2	5	-1

$$c_{11} = 1 \times 2 + 6 \times 4 + 4 \times 4 + 5 \times 4 = 62$$

$$c_{12} = 1 \times (-6) + 6 \times 5 + 4 \times 5 + 5 \times (-2) = 34$$

$$c_{13} = 1 \times 9 + 6 \times (-1) + 4 \times (-1) + 5 \times 5 = 24$$

$$c_{14} = 1 \times (-4) + 6 \times (-3) + 4 \times 7 + 5 \times (-1) = 1$$

$$c_{21} = 4 \times 2 + (-4) \times 4 + 8 \times 4 + 6 \times 4 = 48$$

$$c_{22} = 4 \times (-6) + (-4) \times 5 + 8 \times 5 + 6 \times (-2) = -16$$

$$c_{23} = 4 \times 9 + (-4) \times (-1) + 8 \times (-1) + 6 \times 5 = 62$$

$$c_{24} = 4 \times (-4) + (-4) \times (-3) + 8 \times 7 + 6 \times (-1) = 46$$

$$c_{31} = 4 \times 2 + (-4) \times 4 + 8 \times 4 + 7 \times 4 = 52$$

$$c_{32} = 4 \times (-6) + (-4) \times 5 + 8 \times 5 + 7 \times (-2) = -18$$

$$c_{33} = 4 \times 9 + (-4) \times (-1) + 8 \times (-1) + 7 \times 5 = 67$$

$$c_{34} = 4 \times (-4) + (-4) \times (-3) + 8 \times 7 + 7 \times (-1) = 45$$

$$c_{41} = 4 \times 2 + (-4) \times 4 + 8 \times 4 + (-9) \times 4 = -12$$

$$c_{42} = 4 \times (-6) + (-4) \times 5 + 8 \times 5 + (-9) \times (-2) = 14$$

$$c_{43} = 4 \times 9 + (-4) \times (-1) + 8 \times (-1) + (-9) \times 5 = -13$$

$$c_{44} = 4 \times (-4) + (-4) \times (-3) + 8 \times 7 + (-9) \times (-1) = 61$$

**Result:**

62	34	24	1
48	-16	62	46
52	-18	67	45
-12	14	-13	61

## Matrix 2 x 3 Multiplied a Vector

Matrix A

3      5      -4  
2      3      -2

Matrix B

3  
4  
-2

$$c_{11} = 3 \times 3 + 5 \times 4 + (-4) \times (-2) = 37$$

$$c_{21} = 2 \times 3 + 3 \times 4 + (-2) \times (-2) = 22$$

**Result :**

C:  
37  
22

Matrix A

3      5  
2      3

Matrix B

1      3  
2      4

$$c_{11} = 3 \times 3 + 5 \times 4 = 29$$

$$c_{21} = 2 \times 3 + 3 \times 4 = 18$$

**Result:**

29

18

## **2x2 Matrix Multiplication**

Matrix A

1      6

4      -4

Matrix B

2      9

4      5

$$c_{11} = 1 \times 2 + 6 \times 4 = 26$$

$$c_{12} = 1 \times 9 + 6 \times 5 = 39$$

$$c_{21} = 4 \times 2 + (-4) \times 4 = -8$$

$$c_{22} = 4 \times 9 + (-4) \times 5 = 16$$

**Result:**

26      39

8      16