

Multiply Matrices:

A: (3x3)
B: (3x1)

AB = (3x3)(3x1) = (3x1)
BA = (3x1)(3x3)

- 2) (2x3)(2x3) NP
- 3) (3x1)(1x3) = (3x3)
- 4) (3x3)(1x3) NP
- 5) (2x2)(2x2) = 2x2

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6) (2x2)(2x3) = 2x3

$$\begin{bmatrix} -2 & 7 \end{bmatrix} \begin{bmatrix} -1 & 3 \\ -2 & 1 \end{bmatrix}$$

(1)(-1) + 4(-2) 1(3) + 4(1)
-2(-1) + 7(-2) -2(3) + 7(1)

$$\begin{bmatrix} -9 & 16 & 7 \\ -12 & 28 & 1 \end{bmatrix}$$

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7) (1x3)(3x1) = 1x1

$$\begin{bmatrix} 4 & 5 & -4 \end{bmatrix} \begin{bmatrix} 5 \\ 6 \\ 11 \end{bmatrix}$$

4(5) + 5(6) + -4(11) = [6]
20 + 30 - 44 = [6]

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8) (2x2)(3x3) NP

$$\begin{bmatrix} 28 & -88 & 8 \\ -31 & 55 & 22 \\ -20 & 44 & 8 \end{bmatrix}$$

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Determinants: square matrix

$$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - cb$$

1) $\begin{vmatrix} -4 & 2 \\ 8 & 0 \end{vmatrix} = -4(0) - 2(8) = -16$

3) $\begin{vmatrix} 1 & 4 \\ 5 & 1 \end{vmatrix} = 1(1) - 4(5) = -19$

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using diagonals: $0 + 3 + 36 = 39$
 $0(0)(-5) + -1(-1)(3) + 3(6)(2)$

$$\begin{vmatrix} 3 & 2 & -5 & 3 & 2 \\ 6 & 0 & -1 & 6 & 0 \\ 0 & -1 & 3 & 0 & -1 \end{vmatrix}$$

$3(6)(3) + 2(-1)(0) - 5(6)(-1)$
 $0 + -2 + 30 = 30$
 $30 - 39 = -9$

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11) $A = \begin{vmatrix} -1 & 2 & 7 & -1 & 2 \\ 2 & -1 & -1 & 2 & -1 \\ 3 & 5 & 2 & 3 & 5 \end{vmatrix}$

$\det A = 66 - 8 = 74$

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Using expansion by minors

12) $\begin{vmatrix} 4 & 2 & 1 \\ 0 & 8 & 9 \\ 0 & 3 & 7 \end{vmatrix}$

$= -4 \begin{vmatrix} 8 & 9 \\ 3 & 7 \end{vmatrix} - 0 \begin{vmatrix} 0 & 9 \\ 0 & 7 \end{vmatrix} + 1 \begin{vmatrix} 0 & 8 \\ 0 & 3 \end{vmatrix}$

$= -4(56 - 27) = -4(29) = -116$

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15) $\begin{vmatrix} 4 & 6 & -3 \\ 0 & 1 & 1 \\ 3 & 9 & 11 \end{vmatrix}$

$= 4 \begin{vmatrix} 1 & 1 \\ 9 & 11 \end{vmatrix} - 6 \begin{vmatrix} 0 & 1 \\ 3 & 11 \end{vmatrix} + (-3) \begin{vmatrix} 0 & 1 \\ 3 & 9 \end{vmatrix}$

$4(11 - 9) - 6(0 - 3) + (-3)(0 - 3)$

$4(2) - 6(-3) + (-3)(-3)$

$8 + 18 + 9 = 35$

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Identity matrix: I

$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

2×2 3×3

$A \cdot I = A$

$I \cdot A = A$

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