

**#1-3. Use these matrices:**

$$A = \begin{matrix} & & 3 \times 2 \\ \begin{bmatrix} -1 & 2 \\ 4 & 3 \\ -7 & 6 \end{bmatrix} & & \end{matrix}$$

$$B = \begin{matrix} & & 2 \times 4 \\ \begin{bmatrix} -5 & -2 & -1 & 0 \\ 3 & -3 & 2 & 4 \end{bmatrix} & & \end{matrix}$$

$\begin{bmatrix} 12 \times C \\ 4 \\ -11 \end{bmatrix}$

- What are the dimensions of: (a) matrix A? 3x2 (b) matrix B? 2x4
- In matrix B, what element is in the first row, second column? -2
- In matrix A, identify the element  $a_{2,1}$  4

**#4-5. Complete each of the following to make the statement true.**

- To be able to add or subtract matrices, the dimensions of the matrices must be the same.
- To be able to multiply matrices, the number of columns in the first matrix must be the same as the number of rows in the second matrix.

**#6-8. Provide the missing dimensions so that each of the following will be a true statement.**

6.  $A_{5 \times 3} \cdot B_{3 \times 2} = P_{5 \times 2}$       7.  $A_{2 \times 2} \cdot B_{2 \times 6} = P_{2 \times 6}$       8.  $A_{1 \times 8} \cdot B_{8 \times 3} = P_{1 \times 3}$

**#9-10. Solve the following matrix equations for x, y, and z.**

<p>9. <math>\begin{bmatrix} 3x+1 &amp; 5 \\ -4z &amp; -3 \end{bmatrix} = \begin{bmatrix} x-15 &amp; 5 \\ 18 &amp; \frac{1}{4}y+2 \end{bmatrix}</math></p> <p><math>3x+1 = x-15</math>  <math>2x+1 = -15</math>  <math>2x = -16</math>  <math>x = -8</math></p> <p><math>\frac{1}{4}y+2 = -3</math>  <math>\frac{1}{4}y = -5</math>  <math>y = -20</math></p> <p><math>-4z = 18</math>  <math>z = \frac{-18}{4} = \frac{-9}{2}</math></p>	<p>10. <math>2 \begin{bmatrix} 4+3y &amp; 1 \\ -5 &amp; x \end{bmatrix} + \begin{bmatrix} 1 &amp; 6-5z \\ 2 &amp; 4 \end{bmatrix} = \begin{bmatrix} y-3 &amp; 3 \\ -8 &amp; -2 \end{bmatrix}</math></p> <p><math>2x+4 = -2</math>  <math>2x = -6</math>  <math>x = -3</math></p> <p><math>2(4+3y)+1 = y-3</math>  <math>8+6y+1 = y-3</math>  <math>6y+9 = y-3</math>  <math>5y+9 = -3</math>  <math>5y = -12</math>  <math>y = \frac{-12}{5}</math></p> <p><math>2+6-5z = 3</math>  <math>8-5z = 3</math>  <math>-5z = -5</math>  <math>z = 1</math></p>
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#11-19. Perform the indicated operations. If not possible, give an explanation.

11.  $\begin{bmatrix} 8 & 4 \\ 3 & 0 \end{bmatrix} - 3 \begin{bmatrix} 2 & 4 \\ -1 & -6 \end{bmatrix} =$

$$\begin{bmatrix} 8 & 4 \\ 3 & 0 \end{bmatrix} + \begin{bmatrix} -6 & -12 \\ 3 & 18 \end{bmatrix}$$

$$\begin{bmatrix} 2 & -8 \\ 6 & 18 \end{bmatrix}$$

12.  $\begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix} \begin{bmatrix} 5 & 1 \\ 2 & -6 \end{bmatrix} =$   $\begin{matrix} R \times C \\ 2 \times 2 \quad 2 \times 2 = 2 \times 2 \end{matrix}$

$$\begin{bmatrix} 10+6 & 2-18 \\ -5+8 & -1-24 \end{bmatrix}$$

$$\begin{bmatrix} 16 & -16 \\ 3 & -25 \end{bmatrix}$$

13.  $\begin{vmatrix} 2 & -2 \\ 5 & 3 \end{vmatrix} =$

$$6 - (-10) = 16$$

14.  $\begin{bmatrix} 1 & 20 & 8 \\ 30 & 6 & 9 \end{bmatrix} + \frac{1}{2} \begin{bmatrix} 2 & 4 & 8 \\ -8 & -6 & 12 \end{bmatrix} =$

$$\begin{bmatrix} 1 & 20 & 8 \\ 30 & 6 & 9 \end{bmatrix} + \begin{bmatrix} 1 & 2 & 4 \\ -4 & -3 & 6 \end{bmatrix}$$

$$\begin{bmatrix} 2 & 22 & 12 \\ 26 & 3 & 15 \end{bmatrix}$$

15.  $I_{5 \times 5} =$

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

16.  $\begin{bmatrix} -2 & 1 \\ 3 & -2 \\ 4 & 3 \end{bmatrix} \cdot \begin{bmatrix} 1 & -1 & 3 \\ 2 & 1 & -2 \end{bmatrix}$

$$3 \times 2 \quad 2 \times 3 = 3 \times 3$$

$$\begin{bmatrix} -2+2 & 2+1 & -6-2 \\ 3-4 & -3-2 & 9+4 \\ 4+6 & -4+3 & 12-6 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 3 & -8 \\ -1 & -5 & 13 \\ 10 & -1 & 6 \end{bmatrix}$$

17.  $B = \begin{bmatrix} 2 & -2 \\ 5 & 3 \end{bmatrix}$ , find  $B^{-1}$

$$\text{Det} = 6 - (-10) = 16$$

$$B^{-1} = \frac{1}{16} \begin{bmatrix} 3 & 2 \\ -5 & 2 \end{bmatrix}$$

$$B^{-1} = \begin{bmatrix} 3/16 & 1/8 \\ -5/16 & 1/8 \end{bmatrix}$$

18.  $A = \begin{bmatrix} -2 & 3 & 1 \\ -1 & 0 & 6 \\ 2 & 4 & -1 \end{bmatrix}$ , find

$$|A| = \begin{vmatrix} -2 & 3 & 1 \\ -1 & 0 & 6 \\ 2 & 4 & -1 \end{vmatrix} = -2(3) - (-4) + 12$$

$$= (0+36-4) - (0-48+3)$$

$$= 32 - (-45)$$

$$= \boxed{77}$$

19.  $A = \begin{bmatrix} 7 & -2 \\ -9 & 3 \end{bmatrix}$ , find  $A^{-1}$

$$\text{Det} = 21 - 18 = 3$$

$$A^{-1} = \frac{1}{3} \begin{bmatrix} 3 & 2 \\ 9 & 7 \end{bmatrix}$$

$$A^{-1} = \begin{bmatrix} 1 & 2/3 \\ 3 & 7/3 \end{bmatrix}$$