Name ___Thuston___

#1-3. Use these matrices:

$$A = \begin{bmatrix} -1 & 2 \\ 4 & 3 \\ -7 & 6 \end{bmatrix} \qquad B = \begin{bmatrix} -5 & -2 & -1 & 0 \\ 3 & -3 & 2 & 4 \end{bmatrix}$$

1. What are the dimensions of: (a) matrix A? ___3×2___ (b) matrix B? ___2×4___

2. In matrix B, what element is in the first row, second column? ___−2___

3. In matrix A, identify the element $a_{2,1}$ ___4___

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

4. To be able to add or subtract matrices, the ___dimensions___ of the matrices must be the ___same___ .

5. 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. $A_{5x3} \cdot B_{3x2} = P$ ___5×2___

7. $A_{2x2} \cdot B$ ___2×6___ $= P_{2x6}$

8. A ___1×8___ $\cdot B_{8x3} = P_{1x3}$

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

9.
$$\begin{bmatrix} 3x+1 & 5 \\ -4z & -3 \end{bmatrix} = \begin{bmatrix} x-15 & 5 \\ 18 & \frac{1}{4}y+2 \end{bmatrix}$$

$3x+1=x-15$

$2x=-16$

$\boxed{x=-8}$

$\frac{1}{4}y+2=-3$

$\frac{1}{4}y=-5$

$\boxed{y=-20}$

$-4z=18$

$\boxed{z=-\frac{9}{2}}$

10.
$$2\begin{bmatrix} 4+3y & 1 \\ -5 & x \end{bmatrix} + \begin{bmatrix} 1 & 6-5z \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} y-3 & 3 \\ -8 & -2 \end{bmatrix}$$

$8+6y+1=y-3$

$5y=-12$

$\boxed{y=-\frac{12}{5}}$

$2x+4=-2$

$2x=-6$

$\boxed{x=-3}$

$2+6-5z=3$

$-5z=-5$

$\boxed{z=1}$

#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. $\begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix} \begin{bmatrix} 5 & 1 \\ 2 & -6 \end{bmatrix} =$

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

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

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

$6-(-10)$

$= 16$

14.

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

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

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

15. $I_{5x5} =$

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

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

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

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

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

$6-(-10) = 16$

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

$= \begin{bmatrix} \dfrac{3}{16} & \dfrac{1}{8} \\ \dfrac{-5}{16} & \dfrac{1}{8} \end{bmatrix}$

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

$|A|$

$(0+36+^-4)$

$-(0+^-48+3)$

$= (32)-(-45)$

$= 77$

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

$21-18 = 3$

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

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