

Name key Hour \_\_\_\_\_

Honors Practice Matrices Test – Show your work!

Solve each matrix equation.

$$1. B + \begin{bmatrix} 4 & 7 \\ 0 & 3 \\ 1 & 6 \end{bmatrix} = \begin{bmatrix} 4 & 2 \\ 9 & -2 \\ 2 & -1 \end{bmatrix}$$

$$1. B = \begin{bmatrix} 0 & -5 \\ 9 & -5 \\ 1 & -7 \end{bmatrix}$$

$$2. C - \begin{bmatrix} 0 & -3 \\ 2 & -6 \end{bmatrix} = \begin{bmatrix} -4 & 5 \\ -2 & 6 \end{bmatrix}$$

$$2. B = \begin{bmatrix} -4 & 2 \\ 0 & 0 \end{bmatrix}$$

$$\begin{aligned} C - (-3) &= 5 \\ C + 3 &= 5 \\ C &= 2 \end{aligned}$$

Find the value of each variable.

$$3. \begin{bmatrix} 10 & -3 & -2 \\ 1 & 11 & -1 \end{bmatrix} = \begin{bmatrix} 3x+1 & -3 & 2-y \\ 1 & 3x+2 & -1 \end{bmatrix}$$

$$3. x = \underline{3} \quad y = \underline{4}$$

$$\begin{aligned} 10 &= 3x+1 \\ -1 &= -1 \\ 9 &= 3x \\ x &= 3 \end{aligned}$$

$$\begin{aligned} -2 &= 2-y \\ -2 &= 2-y \\ -4 &= -y \\ 4 &= y \end{aligned}$$

$$4. \begin{bmatrix} 2 & 3 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -2 \\ 4 \end{bmatrix}$$

$$4. x = \underline{2} \quad y = \underline{-2}$$

$$\det = -2 - 3 = -5$$

$$A^{-1} = -\frac{1}{5} \begin{bmatrix} -1 & -3 \\ -1 & 2 \end{bmatrix} = \begin{bmatrix} \frac{1}{5} & \frac{3}{5} \\ \frac{1}{5} & -\frac{2}{5} \end{bmatrix} \begin{bmatrix} -2 \\ 4 \end{bmatrix}$$

$$\begin{aligned} -\frac{2}{5} + \frac{12}{5} &= \frac{10}{5} = 2 \\ -\frac{2}{5} - \frac{8}{5} &= -\frac{10}{5} = -2 \end{aligned} \quad \begin{bmatrix} 2 \\ -2 \end{bmatrix}$$

For questions 5 – 14, use the following matrices to perform each operation.

$$A = \begin{bmatrix} 4 & 5 \\ 4 & -5 \end{bmatrix}$$

$$B = \begin{bmatrix} -4 & 2 \\ 10 & 5 \end{bmatrix}$$

$$C = \begin{bmatrix} 2 & -2 & 6 \\ -4 & 3 & 8 \end{bmatrix}$$

$$D = \begin{bmatrix} 5 & 3 & 1 \\ 2 & 7 & 4 \end{bmatrix}$$

5. Find  $2A$

$$\begin{bmatrix} 8 & 10 \\ 8 & -10 \end{bmatrix}$$

6. Find  $A + B$

$$\begin{bmatrix} 0 & 7 \\ 14 & 0 \end{bmatrix}$$

7. Find  $D - C$

$$\begin{bmatrix} 3 & 5 & -5 \\ 6 & 4 & -4 \end{bmatrix}$$

8. Find  $AC$

$$\begin{bmatrix} 4 & 5 \\ 4 & -5 \end{bmatrix} \begin{bmatrix} 2 & -2 & 6 \\ -4 & 3 & 8 \end{bmatrix}$$

$$\begin{bmatrix} 8-20 & -8+15 & 24+40 \\ 8+20 & -8-15 & 24-40 \end{bmatrix}$$

9. Find  $3BD$

$$8. \begin{bmatrix} -12 & 7 & 64 \\ 28 & -23 & -16 \end{bmatrix}$$

$$9. \begin{bmatrix} -48 & 6 & 12 \\ 180 & 195 & 90 \end{bmatrix}$$

$$10. \begin{bmatrix} 14 & 49 & 28 \\ 70 & 42 & 14 \end{bmatrix}$$

10. Find  $(A+B)D$

11. Find  $\det A$

$$-20 - 20 = -40$$

12. Find  $A^{-1}$

$$-\frac{1}{40} \begin{bmatrix} -5 & -5 \\ -4 & 4 \end{bmatrix}$$

$$11. \det A = \underline{-40}$$

$$12. A^{-1} = \begin{bmatrix} \frac{1}{8} & \frac{1}{8} \\ \frac{1}{10} & -\frac{1}{10} \end{bmatrix}$$

13. Find  $\det B$

$$-20 - 20 = -40$$

14. Find  $B^{-1}$

$$-\frac{1}{40} \begin{bmatrix} 5 & -2 \\ -10 & -4 \end{bmatrix}$$

$$13. \det B = \underline{-40}$$

$$14. B^{-1} = \begin{bmatrix} -\frac{1}{8} & \frac{1}{20} \\ \frac{1}{4} & \frac{1}{10} \end{bmatrix}$$

Solve each system of equations using matrices.

15.  $2x - 5y = 5$

$x - y = 4$

$$\begin{bmatrix} 2 & -5 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 4 \end{bmatrix}$$

$\det = -2 - (-5) = 3$

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

$$\begin{bmatrix} 5 \\ 4 \end{bmatrix} = \begin{bmatrix} -\frac{5}{3} + \frac{20}{3} \\ -\frac{5}{3} + \frac{8}{3} \end{bmatrix} = \begin{bmatrix} \frac{15}{3} \\ \frac{3}{3} \end{bmatrix} = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$$

15.  $\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$   
or  $(5, 1)$

16.  $2x - y = 7$

$-4x + 2y = -14$

$\det = 4 - 4 = 0 \rightarrow$  No inverse

$$\begin{bmatrix} 2 & -1 \\ -4 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 7 \\ -14 \end{bmatrix}$$

16. Not possible

17.  $2x + 5y = 7$

$3x - y = 5$

$$\begin{bmatrix} 2 & 5 \\ 3 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 7 \\ 5 \end{bmatrix}$$

$\det = -2 - 15 = -17$

$$A^{-1} = -\frac{1}{17} \begin{bmatrix} -1 & -5 \\ -3 & 2 \end{bmatrix} = \begin{bmatrix} \frac{1}{17} & \frac{5}{17} \\ \frac{3}{17} & -\frac{2}{17} \end{bmatrix} \begin{bmatrix} 7 \\ 5 \end{bmatrix}$$

$$\begin{aligned} \frac{7}{17} + \frac{25}{17} &= \frac{32}{17} \\ \frac{21}{17} - \frac{10}{17} &= \frac{11}{17} \end{aligned}$$

17.  $\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} \frac{32}{17} \\ \frac{11}{17} \end{bmatrix}$   
 $(\frac{32}{17}, \frac{11}{17})$

18.  $x + 2y - z = 7$

$2x - 3y - 4z = -3$

$x + y + z = 0$

$$\begin{bmatrix} 1 & 2 & -1 \\ 2 & -3 & -4 \\ 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 7 \\ -3 \\ 0 \end{bmatrix}$$

18.  $(-1, 3, -2)$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -1 \\ 3 \\ -2 \end{bmatrix}$$

19. Find  $\det \begin{bmatrix} 1 & 0 & 0 \\ -1 & 2 & 3 \\ 4 & -1 & 2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ -1 & 2 \\ 4 & -1 \end{bmatrix}$

$4 + 0 + 0 - (0 - 3 + 0)$

$4 - (-3)$

$4 + 3 = 7$

19. 7

calculator

20.  $\begin{bmatrix} -2 & 1 & -1 \\ 2 & 0 & 4 \\ 0 & 2 & 5 \end{bmatrix}^{-1}$

calculator

20.  $\begin{bmatrix} 4 & -3.5 & 2 \\ -5 & -5 & 3 \\ 2 & 2 & -1 \end{bmatrix}$