

# Unit #1

## (Matrix) Review

Name: \_\_\_\_\_

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

1. State the  $4 \times 4$  identity matrix.

2. Explain why a  $3 \times 2$  matrix does not have an inverse.

Not a square matrix.

3. Create a square matrix that does not have an inverse.

4. Will every square matrix have an identity?

Yes.

Too many answers to list. Be creative 😊

5. True or False:  $\begin{bmatrix} 6 & 1 \\ 0 & 4 \end{bmatrix} \begin{bmatrix} 1 & -1 \\ 6 & 24 \\ 0 & 1 \\ 4 & 1 \end{bmatrix} = I$

So True!

Use the matrices below to answer questions 6-15:

$$R = \begin{bmatrix} 9 & 6 & 7 \\ 2 & 5 & 0 \\ 10 & 3 & 11 \end{bmatrix}$$

$$S = \begin{bmatrix} 5 & -2 & 4 & 3 \\ 0 & 8 & 0 & -1 \end{bmatrix}$$

$$T = \begin{bmatrix} 8 & -1 & 6 \\ -7 & 0 & 2 \\ 4 & 9 & -5 \end{bmatrix}$$

$$U = \begin{bmatrix} 2 & x & -2 & 11 \\ -4 & 3 & 5 & 9 \end{bmatrix}$$

6. What are the dimensions of matrix S?

$2 \times 4$

7. Identify element  $r_{3,3}$ .

$= 0$

8. The value of  $x$  is what element?  $= U_{1,2}$

$R \in T, S \in U$

9. Which matrices have the same dimensions?

10.  $R+U$  n/a mismatched dims

11.  $-0.5R$

12.  $U \cdot S$

13.  $3R+T$

$$\textcircled{11} \begin{bmatrix} -4.5 & -3 & -3.5 \\ -1 & -2.5 & 0 \\ -5 & -1.5 & -5.5 \end{bmatrix}$$

$\textcircled{13}$

$$\textcircled{12} \begin{bmatrix} -3 & x+2 & -6 & 8 \\ -4 & -5 & 5 & 10 \end{bmatrix}$$

$$\textcircled{13} \begin{bmatrix} 35 & 17 & 27 \\ -1 & 15 & 2 \\ 34 & 18 & 28 \end{bmatrix}$$

Perform the indicated operations.

$$14. \begin{bmatrix} 1 & 3 & 3 \\ -2 & 4 & 4 \end{bmatrix} - 2 \begin{bmatrix} 5 & 5 & -2 \\ 3 & 6 & 2 \end{bmatrix}$$

$$16. \begin{bmatrix} -2 & 1 \\ 4 & 0 \\ 2 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \\ 5 \end{bmatrix}$$

$$\begin{bmatrix} 3 \\ 4 \\ 12 \end{bmatrix}$$

$$15. \begin{bmatrix} 6 & 1 \\ 0 & 8 \end{bmatrix} \cdot \begin{bmatrix} -4 & 3 \\ 7 & 11 \\ 3 & 1 \end{bmatrix}$$

n/a b/c  $[2 \times 2] [3 \times 2]$

$$17. \begin{bmatrix} 1 & 0 & 2 \\ -1 & 0 & 1 \\ -1 & -2 & 0 \end{bmatrix}$$

$\det = 6$

Determine the inverse of each matrix. If it does not exist, write no inverse and explain why it doesn't exist.

$$18. \begin{bmatrix} -1 & 3 \\ 4 & -7 \end{bmatrix}$$

$$\begin{bmatrix} 7/5 & 3/5 \\ 4/5 & 1/5 \end{bmatrix}$$

$$19. \begin{bmatrix} 4 & 6 \\ 6 & 9 \end{bmatrix}$$

no inverse :)

20. Find the area of the triangle that has the following vertices:  $(0, -1), (5, 5), (4, -2)$ .

Solve for the variables.

$$21. \begin{bmatrix} 4x \\ 6y \end{bmatrix} + \begin{bmatrix} 6y - 6 \\ 6x + 12 \end{bmatrix} = \begin{bmatrix} -14 \\ 6 \end{bmatrix} \quad y = -2$$

$$x = 1$$

$$22. \begin{bmatrix} 3 & -1 \\ 4 & x \end{bmatrix} = 25$$

$$x = 7$$

$$23. \begin{bmatrix} x & 2 \\ -1 & 5 \end{bmatrix} \begin{bmatrix} 3 & -2 \\ 4 & 1 \end{bmatrix} = \begin{bmatrix} 9 & 2 \\ -3 & 22 \end{bmatrix}$$

$$x = 3 \quad y = 0$$

$$24. \begin{bmatrix} 1 & -3 \\ 2 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 10 \\ 22 \end{bmatrix}$$

$$x = 11.5 \quad y = 2.5$$

Solve each system using inverse matrices.

$$25. \begin{cases} 2x + y = 3 \\ -2x + y = 1 \end{cases} \quad (1/2, 2)$$

$$26. \begin{cases} x + 2y = 200 \\ x = y + 50 \end{cases} \quad (100, 50)$$

$$27. \begin{cases} 5x - 3y = -4 \\ x + y = -4 \end{cases} \quad (-2, -2)$$

$$28. \begin{cases} 3x + 7y = 48 \\ 5x - 7y = -32 \end{cases} \quad (2, 6)$$

Solve each system using augmented matrices.

$$29. \begin{cases} y = -\frac{2}{3}x + 4 \\ 2x + 3y = -6 \end{cases}$$

no real soln.  $\emptyset$

$$30. \begin{cases} 2x + y = 6 \\ 3y = -6x + 9 \end{cases}$$

no real soln.  $\emptyset$

$$\textcircled{14} \begin{bmatrix} -9 & -7 & 7 \\ -8 & -8 & 0 \end{bmatrix}$$