# Matrix Review

**Simplify.  Write "undefined" for expressions that are undefined. (Non Calcluator Section)**

1) $\begin{bmatrix} 0 & 0 & -5 \\ -1 & -1 & 1 \end{bmatrix} + \begin{bmatrix} -1 & 3 & 3 \\ 3 & -1 & 0 \end{bmatrix}$

2) $\begin{bmatrix} -5 & 0 \end{bmatrix} - \begin{bmatrix} 2 & 0 \end{bmatrix}$

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

4) $\begin{bmatrix} 3 \\ 6 \end{bmatrix} + \begin{bmatrix} 5 \\ 2 \end{bmatrix}$

5) $\begin{bmatrix} 0 & -4 \\ 4 & -5 \end{bmatrix} \cdot \begin{bmatrix} -4 & -1 \\ -5 & 6 \end{bmatrix}$

6) $\begin{bmatrix} 6 & 4 & -1 & 0 \\ 0 & -4 & -5 & 2 \end{bmatrix} \cdot \begin{bmatrix} -6 & 6 \\ -1 & 2 \\ -1 & 0 \\ -1 & 6 \end{bmatrix}$

7) $\begin{bmatrix} 3 & -3 & 1 & -4 \\ 3 & 6 & -2 & 1 \end{bmatrix} \cdot \begin{bmatrix} 2 & -4 \\ 4 & 2 \\ 5 & 0 \\ 6 & 3 \end{bmatrix}$

8) $\begin{bmatrix} 5 & 3 & 1 \\ 2 & 6 & 3 \end{bmatrix} \cdot \begin{bmatrix} 0 & 0 \\ 3 & 1 \\ 6 & 3 \end{bmatrix} + \begin{bmatrix} 1 & -1 \\ -6 & 2 \end{bmatrix}$

9) $\begin{bmatrix} 4 & -2 \\ 0 & -3 \end{bmatrix} \cdot \begin{bmatrix} -1 & -2 \\ 5 & 5 \end{bmatrix} + \begin{bmatrix} -4 & 3 \\ -2 & 5 \end{bmatrix}$

**Simplify. Write "undefined" for expressions that are undefined. (Non Calcluator Section)**

1) $\begin{bmatrix} 0 & 0 & -5 \\ -1 & -1 & 1 \end{bmatrix} + \begin{bmatrix} -1 & 3 & 3 \\ 3 & -1 & 0 \end{bmatrix}$

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

2) $\begin{bmatrix} -5 & 0 \end{bmatrix} - \begin{bmatrix} 2 & 0 \end{bmatrix}$

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

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

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

4) $\begin{bmatrix} 3 \\ 6 \end{bmatrix} + \begin{bmatrix} 5 \\ 2 \end{bmatrix}$

$\begin{bmatrix} 8 \\ 8 \end{bmatrix}$

5) $\begin{bmatrix} 0 & -4 \\ 4 & -5 \end{bmatrix} \cdot \begin{bmatrix} -4 & -1 \\ -5 & 6 \end{bmatrix}$

$\begin{bmatrix} 20 & -24 \\ 9 & -34 \end{bmatrix}$

6) $\begin{bmatrix} 6 & 4 & -1 & 0 \\ 0 & -4 & -5 & 2 \end{bmatrix} \cdot \begin{bmatrix} -6 & 6 \\ -1 & 2 \\ -1 & 0 \\ -1 & 6 \end{bmatrix}$

$\begin{bmatrix} -39 & 44 \\ 7 & 4 \end{bmatrix}$

7) $\begin{bmatrix} 3 & -3 & 1 & -4 \\ 3 & 6 & -2 & 1 \end{bmatrix} \cdot \begin{bmatrix} 2 & -4 \\ 4 & 2 \\ 5 & 0 \\ 6 & 3 \end{bmatrix}$

$\begin{bmatrix} -25 & -30 \\ 26 & 3 \end{bmatrix}$

8) $\begin{bmatrix} 5 & 3 & 1 \\ 2 & 6 & 3 \end{bmatrix} \cdot \begin{bmatrix} 0 & 0 \\ 3 & 1 \\ 6 & 3 \end{bmatrix} + \begin{bmatrix} 1 & -1 \\ -6 & 2 \end{bmatrix}$

$\begin{bmatrix} 16 & 5 \\ 30 & 17 \end{bmatrix}$

9) $\begin{bmatrix} 4 & -2 \\ 0 & -3 \end{bmatrix} \cdot \begin{bmatrix} -1 & -2 \\ 5 & 5 \end{bmatrix} + \begin{bmatrix} -4 & 3 \\ -2 & 5 \end{bmatrix}$

$\begin{bmatrix} -18 & -15 \\ -17 & -10 \end{bmatrix}$

**Evaluate each determinant. (10 &11 Non Calculator)**

10) $\begin{vmatrix} 0 & -4 \\ -1 & -5 \end{vmatrix}$

11) $\begin{vmatrix} 2 & 1 \\ -3 & 2 \end{vmatrix}$

12) $\begin{vmatrix} 6 & -4 & 4 \\ -6 & -2 & -1 \\ 1 & 2 & 3 \end{vmatrix}$

13) $\begin{vmatrix} 5 & -5 & 5 \\ -7 & 1 & 2 \\ 7 & 0 & 3 \end{vmatrix}$

**For each matrix state if an inverse exists. (Non Calculator)**

14) $\begin{bmatrix} -6 & 0 \\ -1 & 0 \end{bmatrix}$

15) $\begin{bmatrix} 11 & -1 \\ -11 & 1 \end{bmatrix}$

**Find the inverse of each matrix. (16 &17 Non Calculator)**

16) $\begin{bmatrix} 7 & 0 \\ -4 & 8 \end{bmatrix}$

17) $\begin{bmatrix} -5 & -8 \\ 6 & -6 \end{bmatrix}$

18) $\begin{bmatrix} 4 & -1 & 1 \\ -3 & -6 & -3 \\ 2 & 6 & 3 \end{bmatrix}$

19) $\begin{bmatrix} 2 & 6 & -2 \\ -3 & -4 & 0 \\ 5 & -2 & 6 \end{bmatrix}$

**Use the Multiplication by the Inverse Method to solve each system.**

20) $-2x + 2y = -12$
$-6x + 3y = -24$

21) $-6x - y = -11$
$4x - y = 9$

**Evaluate each determinant. (10 &11 Non Calculator)**

10) $\begin{vmatrix} 0 & -4 \\ -1 & -5 \end{vmatrix}$

$-4$

11) $\begin{vmatrix} 2 & 1 \\ -3 & 2 \end{vmatrix}$

$7$

12) $\begin{vmatrix} 6 & -4 & 4 \\ -6 & -2 & -1 \\ 1 & 2 & 3 \end{vmatrix}$

$-132$

13) $\begin{vmatrix} 5 & -5 & 5 \\ -7 & 1 & 2 \\ 7 & 0 & 3 \end{vmatrix}$

$-195$

**For each matrix state if an inverse exists. (Non Calculator)**

14) $\begin{bmatrix} -6 & 0 \\ -1 & 0 \end{bmatrix}$

No

15) $\begin{bmatrix} 11 & -1 \\ -11 & 1 \end{bmatrix}$ No

**Find the inverse of each matrix.  (16 &17 Non Calculator)**

16) $\begin{bmatrix} 7 & 0 \\ -4 & 8 \end{bmatrix}$

$\begin{bmatrix} \dfrac{1}{7} & 0 \\ \dfrac{1}{14} & \dfrac{1}{8} \end{bmatrix}$

17) $\begin{bmatrix} -5 & -8 \\ 6 & -6 \end{bmatrix}$ $\begin{bmatrix} -\dfrac{1}{13} & \dfrac{4}{39} \\ -\dfrac{1}{13} & -\dfrac{5}{78} \end{bmatrix}$

18) $\begin{bmatrix} 4 & -1 & 1 \\ -3 & -6 & -3 \\ 2 & 6 & 3 \end{bmatrix}$ $\begin{bmatrix} 0 & -1 & -1 \\ -\dfrac{1}{3} & -\dfrac{10}{9} & -1 \\ \dfrac{2}{3} & \dfrac{26}{9} & 3 \end{bmatrix}$

19) $\begin{bmatrix} 2 & 6 & -2 \\ -3 & -4 & 0 \\ 5 & -2 & 6 \end{bmatrix}$ $\begin{bmatrix} -3 & -4 & -1 \\ \dfrac{9}{4} & \dfrac{11}{4} & \dfrac{3}{4} \\ \dfrac{13}{4} & \dfrac{17}{4} & \dfrac{5}{4} \end{bmatrix}$

**Use the Multiplication by the Inverse Method to solve each system.**

20) $-2x + 2y = -12$
    $-6x + 3y = -24$
    $(2, -4)$

21) $-6x - y = -11$
    $4x - y = 9$
    $(2, -1)$

22) $6x + 4y + 4z = 4$
$-2x + z = 1$
$-x + 2y - z = -9$

23) $-6x + 6y - z = -3$
$-6x + 6y + z = -9$
$3x - 3y = -12$

**Solve each equation or state if there is no unique solution. ( Non Calculator Section)**

24) $2C = \begin{bmatrix} 8 \\ -8 \\ -20 \\ -20 \end{bmatrix}$

25) $\begin{bmatrix} -30 \\ 30 \\ 30 \end{bmatrix} = 5Z$

26) $2X = \begin{bmatrix} 0 \\ -12 \\ -10 \\ 20 \end{bmatrix}$

**Find the Area of the Triangle given the Triangles' Vertices.**

27) $(2,3),(3,0),\&(-1,-1)$

**Decode the following message.**

28) 18 19 38 21 50 25 using the inverse of
$\begin{bmatrix} 2 & 1 \\ -1 & 0 \end{bmatrix}$

22) $6x + 4y + 4z = 4$
$-2x + z = 1$
$-x + 2y - z = -9$

$$\left( \frac{4}{5}, -\frac{14}{5}, \frac{13}{5} \right)$$

23) $-6x + 6y - z = -3$
$-6x + 6y + z = -9$
$3x - 3y = -12$

No unique solution

**Solve each equation or state if there is no unique solution. ( Non Calculator Section)**

24) $2C = \begin{bmatrix} 8 \\ -8 \\ -20 \\ -20 \end{bmatrix}$

$\begin{bmatrix} 4 \\ -4 \\ -10 \\ -10 \end{bmatrix}$

25) $\begin{bmatrix} -30 \\ 30 \\ 30 \end{bmatrix} = 5Z$

$\begin{bmatrix} -6 \\ 6 \\ 6 \end{bmatrix}$

26) $2X = \begin{bmatrix} 0 \\ -12 \\ -10 \\ 20 \end{bmatrix}$

$\begin{bmatrix} 0 \\ -6 \\ -5 \\ 10 \end{bmatrix}$

**Find the Area of the Triangle given the Triangles' Vertices.**

27) $(2,3),(3,0),\&(-1,-1)$

**Decode the following message.**

28) 18  19  38  21  50  25  using the inverse of
$\begin{bmatrix} 2 & 1 \\ -1 & 0 \end{bmatrix}$