

Matrix Review*Use separate paper to show work if you run out of space.***Perform the indicated operation:**

1. $\begin{bmatrix} 1 & 3 \\ -2 & 5 \\ 2 & 4 \end{bmatrix} + \begin{bmatrix} 4 & 9 \\ 7 & 1 \\ -2 & 6 \end{bmatrix}$

2. $\begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix} - \begin{bmatrix} -5 & 2 \\ 7 & 1 \end{bmatrix}$

3. $2 \left(\begin{bmatrix} 3 & 2 & 5 \\ -1 & 6 & -2 \end{bmatrix} + \begin{bmatrix} 1 & 3 & -4 \\ 6 & 4 & 2 \end{bmatrix} \right)$

4. $-3 \begin{bmatrix} 1 & 4 \\ -2 & 6 \end{bmatrix} - \left(\begin{bmatrix} 0 & 3 \\ 2 & 6 \end{bmatrix} + \begin{bmatrix} -3 & 2 \\ 5 & -1 \end{bmatrix} \right)$

State the order of each matrix and determine whether the product AB is defined. If it is, state the order of AB :

5. $A = \begin{bmatrix} 1 & -2 \\ 3 & 4 \\ 4 & 1 \end{bmatrix}, B = \begin{bmatrix} 4 & 9 & -3 \end{bmatrix}$

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

Find the product:

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

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

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

Simplify the expression:

10. $\begin{bmatrix} \frac{1}{2} & -1 \\ -\frac{3}{4} & \frac{3}{2} \end{bmatrix} \begin{bmatrix} -3 & -5 \\ 4 & 2 \end{bmatrix}$

11. $\begin{bmatrix} 2 & -4 & 0 \\ 0 & 3 & 6 \\ -1 & 5 & 1 \end{bmatrix} \left(\begin{bmatrix} 1 & 2 \\ -3 & 0 \\ 5 & 1 \end{bmatrix} + \begin{bmatrix} 3 & -1 \\ 0 & 2 \\ 4 & 5 \end{bmatrix} \right)$

Solve the system using Gaussian elimination, with back substitution (by hand)

12. $\begin{cases} 3x - 2y = 8 \\ 4x - 3y = 10 \end{cases}$

13. $\begin{cases} 3x + y - 2z = 1 \\ x - 2y + z = 12 \\ x + 4y + 0z = -18 \end{cases}$

Solve the system using matrices and RREF in the calculator

$$14. \begin{cases} 5x - 2y = -9 \\ -7x + 3y = 14 \end{cases}$$

$$15. \begin{cases} x - y + z = -2 \\ 2x + 0y + 3z = 4 \\ 3y - z = 7 \end{cases}$$

$$16. \begin{cases} x + y - 2z = -9 \\ 2x + y + z = 0 \\ -x - 2y + 6z = 21 \end{cases}$$

The Broadwater Health Club offers three membership plans. With Plan A, you can use all club facilities: the pools, the fitness center, and the Adventure Zone. With Plan B, you can use the pools and the fitness center. With Plan C, you can only use the Adventure Zone. The matrices below show the annual cost for a Single and Family membership for the years 2017-2019:

| | 2017 | |
|---------------|-------------|--------|
| | Single | Family |
| Plan A | 336 | 624 |
| Plan B | 228 | 528 |
| Plan C | 216 | 384 |

| | 2018 | |
|---------------|-------------|--------|
| | Single | Family |
| Plan A | 384 | 720 |
| Plan B | 312 | 576 |
| Plan C | 240 | 432 |

| | 2019 | |
|---------------|-------------|--------|
| | Single | Family |
| Plan A | 420 | 792 |
| Plan B | 360 | 672 |
| Plan C | 288 | 528 |

17. You purchased a Single Plan A in 2017, a Family Plan B in 2018, and a Family Plan A in 2019. How much did you spend on your membership over the three years?

18. You purchased a Family Plan C in 2017 and upgraded to the next highest plan each year. How much did you spend for your membership over the next three years?

19. The crosstown musical was performed on three different evenings. The attendance for each evening is shown in the table at the right. Adult tickets sold for \$4.50, and student tickets sold for \$3.50. Set up matrices and use matrix multiplication to determine how much money was taken in each night.

| | Adults | Students |
|----------------------|---------------|-----------------|
| Opening night | 210 | 150 |
| Second night | 200 | 225 |
| Final night | 255 | 240 |