

Do work on a separate sheet. Show ALL work!

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$$

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

$$C = \begin{bmatrix} -4 & 0 \\ 3 & -1 \end{bmatrix}$$

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

$$E = \begin{bmatrix} 2 & 0 \\ 4 & -1 \\ 6 & 3 \end{bmatrix}$$

$$F = \begin{bmatrix} 4 & 5 & -2 \\ 1 & 3 & -4 \\ 0 & 6 & 8 \end{bmatrix}$$

$$G = \begin{bmatrix} 1 & -5 \\ 3 & 2 \end{bmatrix}$$

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

1. $2C + D$

2. B^t

3. $-3F$

4. CB

5. $|D|$

6. $|F|$ use diagonal method

7. AF

8. G^{-1}

9. What are the dimensions of matrix E ?

10. Give the dimensions of a matrix K which could be multiplied by E so that KE is defined.

11. Give the dimensions of a matrix which could be added to E so that $K+E$ is defined.

12. Write a 2×2 matrix which doesn't have an inverse.

13. Solve the system:

$$5x - 2y = 11$$

$$x + 3y = 9$$

14. Solve for the missing matrix:

$$\begin{bmatrix} 5 & 4 \\ 3 & -6 \end{bmatrix} X + \begin{bmatrix} 1 & 2 & 3 \\ 5 & -2 & 7 \end{bmatrix} = \begin{bmatrix} 0 & 6 & 4 \\ -1 & -2 & 8 \end{bmatrix}$$

15. Solve the system. $-x - y - 3z = -9$

$$-3x - z = 1$$

$$x - 5y + z = 23$$

16. A brokerage company has investments in four states: California, Arkansas, Texas, and South Dakota. The investments are bonds, mortgages, and loans. Matrix M shows the number of millions of dollars in each investment in each state.

$$M = \begin{array}{cccc} & CA & AR & TX & SD \\ \begin{array}{l} \text{Bonds} \\ \text{Mortgages} \\ \text{Loans} \end{array} & \begin{bmatrix} 32 & 8 & 15 & 2 \\ 15 & 20 & 17 & 9 \\ 14 & 22 & 23 & 7 \end{bmatrix} \end{array}$$

The percentages of annual income that the investment yields are bonds, 6%; mortgages, 9%; and loans, 11%. These numbers are represented by a yield matrix, Y.

$$Y = \begin{bmatrix} 0.06 & 0.09 & 0.11 \end{bmatrix}$$

- Find the product Y M. Use the product matrix to find the annual income the company earns from investments in Texas. How much of this comes from mortgages?
- Explain why it is impossible in the mathematical world to find the product M Y.

17. A virus sweeps through a high school, infecting 30% of the 11th graders and 20% of the 12th graders, as represented by matrix P.

$$P = \begin{array}{cc} & 11^{th} & 12^{th} \\ \begin{array}{l} Ill \\ Well \end{array} & \begin{bmatrix} 0.3 & 0.2 \\ 0.7 & 0.8 \end{bmatrix} \end{array}$$

There are 100 11th grade boys, 110 11th grade girls, 120 12th grade boys, and 130 12th grade girls, as represented by matrix S.

$$S = \begin{array}{cc} & Boys & Girls \\ \begin{array}{l} 11^{th} \text{ grade} \\ 12^{th} \text{ grade} \end{array} & \begin{bmatrix} 100 & 110 \\ 120 & 130 \end{bmatrix} \end{array}$$

- Show that the product P S does not equal SP.
- Identify the real world quantities that the elements of the product PS represent.

18. Solve for x and y.

$$a. \begin{bmatrix} 5 & 3 & 3 \\ x & -5 & 1 \\ 5 & 3 & 0 \end{bmatrix} = 39$$

$$b. \begin{bmatrix} 2x-1 & -1 \\ -3 & 3y \\ -6 & -6 \end{bmatrix} \cdot \begin{bmatrix} -1 & 6 \\ 5 & 4 \end{bmatrix} = \begin{bmatrix} -8 & 14 \\ 33 & 6 \\ -24 & -60 \end{bmatrix}$$