

Algebra II
Ch. 4: Matrices Review Sheet

Name _____

CALCULATOR SECTION

Find the determinant. For #1&2

1. $\begin{bmatrix} 2 & 1 & 1 \\ 7 & 4 & -3 \\ -1 & 5 & 1 \end{bmatrix}$ **73**

2. $\begin{bmatrix} 10 & 4 & 6 \\ 2 & -3 & 1 \\ -3 & 2 & 0 \end{bmatrix}$ **-62**

3. Multiply if possible. $\begin{bmatrix} -1 & 4 & -2 \\ 1 & -1 & -4 \end{bmatrix} \cdot \begin{bmatrix} -6 & 2 & -5 \\ 1 & -4 & 2 \\ 3 & 0 & -1 \end{bmatrix}$ $\begin{bmatrix} 4 & -18 & 15 \\ -19 & 6 & -3 \end{bmatrix}$

Find the inverse, if it exists.

4. $\begin{bmatrix} 21 & 12 \\ 7 & 4 \end{bmatrix}$ **does not exist
determinant = 0**

5. $\begin{bmatrix} -7 & -1 & 2 \\ 3 & 6 & 4 \\ 0 & 11 & -2 \end{bmatrix}$ $\begin{bmatrix} -14/113 & 5/113 & -4/113 \\ 3/226 & 7/226 & 17/226 \\ 33/452 & 77/452 & -39/452 \end{bmatrix}$

6. Write as a matrix equation & solve.

$$\begin{cases} 3x + 4y + 2z = 12 \\ -2x - 3y - 4z = -12 \\ 5x + 5y + 6z = 8 \end{cases} \Rightarrow \begin{bmatrix} 3 & 4 & 2 \\ -2 & -3 & -4 \\ 5 & 5 & 6 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 12 \\ -12 \\ 8 \end{bmatrix}$$

$(-7, 8, 1/2)$

7. Write as a matrix equation & solve.

$$\begin{cases} 2x + z = 6 \\ 3x - 2y + 4z = 13 \\ -y - 3z = -15 \end{cases} \Rightarrow \begin{bmatrix} 2 & 0 & 1 \\ 3 & -2 & 4 \\ 0 & -1 & -3 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 6 \\ 13 \\ -15 \end{bmatrix}$$

$(1, 3, 4)$

extra: Find the area of a triangle with vertices:
 $(-3, 2)$ $(-1, 7)$ $(4, -1)$

$$\pm \frac{1}{2} \begin{vmatrix} -3 & 2 & 1 \\ -1 & 7 & 1 \\ 4 & -1 & 1 \end{vmatrix} = 20.5 \text{ sq units}$$

NON-CALCULATOR SECTION

Name the dimensions of the matrices.

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

 2×3

9. $\begin{bmatrix} 8 \\ 7 \\ -2 \\ 3 \end{bmatrix}$

 4×1

10. $[2 \ 43]$

 1×2

Perform indicated operations. #11-15

11. $-3 \begin{bmatrix} 8 & -3 & 2 \\ 4 & -1 & 7 \end{bmatrix}$

$\begin{bmatrix} -24 & 9 & -6 \\ -12 & 3 & -21 \end{bmatrix}$

12. $2 \begin{bmatrix} 8 & -1 \\ 3 & 4 \end{bmatrix} - 3 \begin{bmatrix} -1 & 2 \\ 6 & 0 \end{bmatrix}$

$\begin{bmatrix} 19 & -8 \\ -12 & 8 \end{bmatrix}$

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

$\begin{bmatrix} 30 & -4 & -6 \\ 3 & -6 & 26 \end{bmatrix}$

14. $\begin{bmatrix} -4 & 0 & -8 \\ 7 & -2 & 10 \end{bmatrix} \cdot \begin{bmatrix} -1 & 2 \\ 6 & 0 \end{bmatrix}$

Can't multiply,
wrong dimensions

15. $2 \begin{bmatrix} 3 \\ -1 \\ 4 \end{bmatrix} + 4 \begin{bmatrix} 0 \\ -5 \\ 1 \end{bmatrix} - \begin{bmatrix} -1 \\ 9 \\ -6 \end{bmatrix}$

$\begin{bmatrix} 7 \\ -31 \\ 18 \end{bmatrix}$

Solve for x.

Hint: There are bars, not brackets, around the matrices.

16. $\begin{vmatrix} 3 & -4 \\ 2x & 6 \end{vmatrix} = 34$

$$\cancel{-18} + 8x = 34$$

$$\frac{8x}{8} = \frac{16}{8}$$

$$x = 2$$

17. $\begin{vmatrix} 2 & -1 \\ 3 & 4x \end{vmatrix} = -16$

$$8x + \cancel{-3} = -16$$

$$\frac{8x}{8} = \frac{-19}{8}$$

$$x = -19/8$$

18. Write the system as a matrix equation. DO NOT SOLVE!

$$2w - x + 5y - z = 1$$

$$x + 3y - 6z = 2$$

$$-3w - 9z = 12$$

$$2z = 6$$

$$\begin{bmatrix} w & x & y & z \\ 2 & -1 & 5 & -1 \\ 0 & 1 & 3 & -6 \\ -3 & 0 & 0 & -9 \\ 0 & 0 & 0 & 2 \end{bmatrix} \cdot \begin{bmatrix} w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 12 \\ 6 \end{bmatrix}$$

Fill in the blank.

19a. Two matrices may be added if dimensions are the same.19b. Two matrices may be multiplied if the columns of 1st equal the rows of 2nd19c. A matrix must be square in order for it to have a determinant or an inverse.

Solve the system using matrices. Write the solutions as ordered pairs.

20. $2x + 3y = 7$

$4x - 4y = 4$

$(2, 1)$

21. $-5x - y = 2$

$10x + 3y = 1$

$(-7/5, 5)$

Matrix Review - decoding

$$A = \begin{bmatrix} 5 & 2 \\ -3 & 1 \end{bmatrix} \quad A^{-1} = \begin{bmatrix} 1/11 & -2/11 \\ 3/11 & 5/11 \end{bmatrix}$$

$$10 \times 2 \quad \begin{bmatrix} -5 & 9 \\ -48 & 16 \\ 75 & 41 \\ 77 & 33 \\ 75 & 41 \\ 20 & 8 \\ 55 & 55 \\ 20 & 41 \\ 36 & 54 \\ 6 & 53 \end{bmatrix} \quad \text{New} \quad \begin{bmatrix} 2 & 5 \\ 0 & 16 \\ 18 & 5 \\ 16 & 1 \\ 18 & 5 \\ 4 & 0 \\ 20 & 15 \\ 13 & 15 \\ 18 & 18 \\ 15 & 23 \end{bmatrix}$$

Be Prepared Tomorrow