

Solve by substitution:

$$2x + 3y = 10$$

$$x + 6y = 32$$

$$x = 32 - 6y$$

$$2(32 - 6y) + 3y = 10$$

$$64 - 12y + 3y = 10$$

$$64 - 9y = 10$$

$$-9y = -54$$

$$y = 6$$

$$x = 32 - 6(6)$$

$$x = 32 - 36$$

$$x = -4$$

$$\boxed{(-4, 6)}$$

Solve by elimination:

$$6x + 8y = 20$$

$$(5x - 4y = -26) \cdot 2$$

$$6x + 8y = 20$$

$$10x - 8y = -52$$

$$16x = -32$$

$$x = -2$$

$$6(-2) + 8y = 20$$

$$-12 + 8y = 20$$

$$8y = 32$$

$$y = 4$$

$$\boxed{(-2, 4)}$$

Solve by any method:

$$\left(\frac{1}{4}x + \frac{2}{3}y = 6\right) \cdot 3$$

$$\frac{3}{4}x - \frac{5}{3}y = -4$$

$$-\frac{3}{4}x - \frac{5}{3}y = -18$$

$$\frac{3}{4}x - \frac{5}{3}y = -4$$

$$-\frac{11}{3}y = -22$$

$$-11y = -66$$

$$y = 6$$

$$\frac{1}{4}x + \frac{2}{3}(6) = 6$$

$$\frac{1}{4}x = 2$$

$$x = 8$$

$$\boxed{(8, 6)}$$

Solve each system of inequalities

$$4x + 3y \geq 12 \quad 3y \geq -4x + 12$$

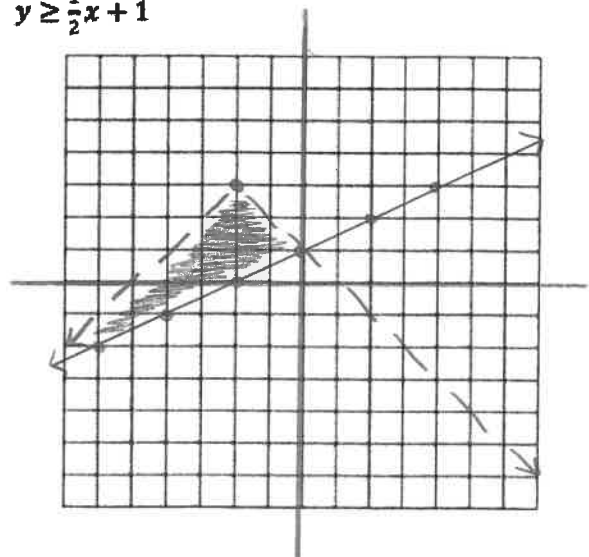
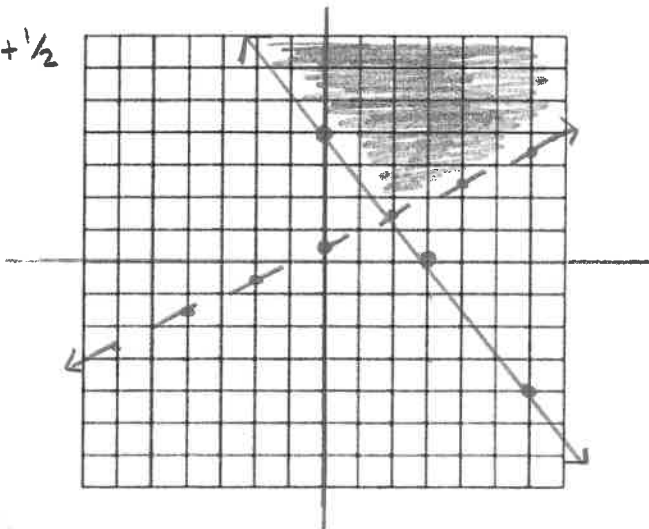
$$2y - x > 1 \quad y \geq -\frac{1}{3}x + 4$$

$$2y > x + 1$$

$$y > \frac{1}{2}x + \frac{1}{2}$$

$$y < -|x + 2| + 3$$

$$y \geq \frac{1}{2}x + 1$$



Solve each system:

$$\begin{array}{l} \text{a) } 6x + 2y - 3z = -17 \\ (7x - 5y + z = 72) \cdot 3 \\ 2x + 8y + 3z = -21 \end{array}$$

$$\begin{array}{r} 6x + 2y - 3z = -17 \\ 2x + 8y + 3z = -21 \\ \hline \end{array}$$

$$8x + 10y = -38$$

$$\begin{array}{l} (8x + 10y = -38) \cdot 13 \\ (27x - 13y = 199) \cdot 10 \end{array}$$

$$\begin{array}{r} 104 + 130y = -494 \\ 270x - 130y = 1990 \\ \hline \end{array}$$

$$374x = 1496$$

$$x = 4$$

$$8(4) + 10y = -38$$

$$10y = -70$$

$$y = -7$$

$$6(4) + 2(-7) - 3z = -17$$

$$24 - 14 - 3z = -17$$

$$-3z = -27$$

$$z = 9$$

$$\boxed{(4, -7, 9)}$$

$$\begin{array}{l} \text{b) } 5x + 7y = -1 \\ -2y + 3z = 9 \\ (7x - z = 27) \cdot 3 \end{array}$$

$$-2y + 3z = 9$$

$$21x - 3z = 81$$

$$21x - 2y = 90$$

$$\begin{array}{l} (5x + 7y = -1) \cdot 2 \\ (21x - 2y = 90) \cdot 7 \end{array}$$

$$10x + 14y = -2$$

$$147x - 14y = 630$$

$$157x = 628$$

$$x = 4$$

$$5(4) + 7y = -1$$

$$20 + 7y = -1$$

$$7y = -21$$

$$y = -3$$

$$-2(-3) + 3z = 9$$

$$6 + 3z = 9$$

$$3z = 3$$

$$z = 1$$

$$\boxed{(4, -3, 1)}$$

Chapter 3 Review
Honors Algebra 2

Use the matrices listed below to answer the following questions. Complete the operations by hand (if possible, then use your calculator to verify the answers. If the operation is not possible explain why.

$$A = \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix} \quad B = \begin{bmatrix} -1 & 3 \\ -2 & 5 \end{bmatrix} \quad C = \begin{bmatrix} 5 & 2 & 3 \\ 1 & -1 & 4 \end{bmatrix} \quad D = \begin{bmatrix} 5 & 6 \\ 1 & -2 \\ -4 & 3 \end{bmatrix} \quad E = \begin{bmatrix} 3 \\ 2 \\ 9 \end{bmatrix} \quad F = \begin{bmatrix} 4 \\ -7 \end{bmatrix}$$

1. What are the dimensions of the matrices A through F?

2×2 2×2 2×3 3×2 3×1 2×1

2. $2A + 3B$

$$\begin{bmatrix} 4 & 6 \\ 2 & 8 \end{bmatrix} + \begin{bmatrix} -3 & 9 \\ -6 & 15 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 15 \\ -4 & 23 \end{bmatrix}$$

3. $D \cdot C$

$$\begin{bmatrix} 5 & 6 \\ 1 & -2 \\ -4 & 3 \end{bmatrix} \begin{bmatrix} 5 & 2 & 3 \\ 1 & -1 & 4 \end{bmatrix} = \begin{bmatrix} 25+6 & 10-6 & 15+24 \\ 5-2 & 2+2 & 3-8 \\ -20+3 & -8-3 & -12+12 \end{bmatrix}$$

$$= \begin{bmatrix} 31 & 4 & 39 \\ 3 & 4 & -5 \\ -17 & -11 & 0 \end{bmatrix}$$

4. $C \cdot D + B$

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

$$= \begin{bmatrix} 25+2-12 & 30-4+9 \\ 5-1-16 & 6+2+12 \end{bmatrix}$$

$$= \begin{bmatrix} 15 & 35 \\ -12 & 20 \end{bmatrix} \quad CD + B = \begin{bmatrix} 14 & 38 \\ -14 & 25 \end{bmatrix}$$

5. $3(B \cdot F)$

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

$$= \begin{bmatrix} -4-21 \\ -8-35 \end{bmatrix}$$

$$= \begin{bmatrix} -25 \\ -43 \end{bmatrix}$$

$$3(BF) = \begin{bmatrix} -75 \\ -129 \end{bmatrix}$$

6. $4D \cdot 2E$

$$\begin{bmatrix} 20 & 24 \\ 4 & -8 \\ -16 & 12 \end{bmatrix} \begin{bmatrix} 6 \\ 4 \\ 18 \end{bmatrix}$$

3×2 3×1

No solution

7. $\frac{1}{2}(C \cdot E)$

$$CE = \begin{bmatrix} 5 & 2 & 3 \\ 1 & -1 & 4 \end{bmatrix} \begin{bmatrix} 3 \\ 2 \\ 9 \end{bmatrix}$$

$$= \begin{bmatrix} 15+4+27 \\ 3-2+36 \end{bmatrix}$$

$$= \begin{bmatrix} 46 \\ 37 \end{bmatrix}$$

$$\frac{1}{2}(CE) = \begin{bmatrix} 23 \\ 37/2 \end{bmatrix}$$

Solve for each variable using the property of matrix equality.

$$8. \begin{bmatrix} 3x \\ -2y \end{bmatrix} = \begin{bmatrix} 14 \\ -6 \end{bmatrix} - \begin{bmatrix} 2y \\ x \end{bmatrix}$$

$$\begin{bmatrix} 3x \\ -2y \end{bmatrix} = \begin{bmatrix} 14-2y \\ -6-x \end{bmatrix}$$

$$3x = 14 - 2y$$

$$-2y = -6 - x$$

$$3x + 2y = 14$$

$$x - 2y = -6$$

$$\hline 4x = 8$$

$$x = 2$$

$$3(2) = 14 - 2y$$

$$-8 = -2y$$

$$4 = y$$

$$\boxed{(2, 4)}$$

$$9. \begin{bmatrix} 3a & b \\ -2c & 4d \end{bmatrix} = \begin{bmatrix} 1 & 3 \\ 3 & 2 \end{bmatrix} \cdot \begin{bmatrix} -1 & 2 \\ 4 & 3 \end{bmatrix}$$

$$= \begin{bmatrix} -1+12 & 2+9 \\ -3+8 & 6+6 \end{bmatrix}$$

$$= \begin{bmatrix} 11 & 11 \\ 5 & 12 \end{bmatrix}$$

$$a = 11/3 \quad d = 3$$

$$b = 11$$

$$c = -5/2$$

Use your calculator to solve the system of equations using augmented matrices. State if there is one solution, no solution, or infinitely many solutions. If there is one solution, then list it.

$$10. \quad 2x + 3y = 8$$

$$3x - 4y = 29$$

$$\begin{bmatrix} 2 & 3 \\ 3 & -4 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 8 \\ 29 \end{bmatrix}$$

$$\det = -8 - 9 = -17$$

$$A^{-1} = \frac{1}{-17} \begin{bmatrix} -4 & -3 \\ -3 & 2 \end{bmatrix} = \begin{bmatrix} 4/17 & 3/17 \\ 3/17 & -2/17 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4/17 & 3/17 \\ 3/17 & -2/17 \end{bmatrix} \begin{bmatrix} 8 \\ 29 \end{bmatrix}$$

$$\boxed{(7, -2)}$$

$$11. \quad -x - 5y - 5z = 2$$

$$4x - 5y + 4z = 19$$

$$x + 5y - z = -20$$

$$\begin{bmatrix} -1 & -5 & -5 \\ 4 & -5 & 4 \\ 1 & 5 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ 19 \\ -20 \end{bmatrix}$$

$$(-2, -3, 3)$$

14. Find the determinant of the following:

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

$$-8 - (-8) = 0$$

15. Find the inverse of the following:

$$\begin{bmatrix} 1 & 0 \\ 2 & 3 \end{bmatrix}$$

$$\det = 3 - 0 = 3$$

$$\frac{1}{3} \begin{bmatrix} 3 & 0 \\ -2 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 0 \\ -2/3 & 1/3 \end{bmatrix}$$

16) Find the determinant of:

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

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

$$(8 + 0 + (-60)) - (-40 + (-4) + 0)$$

$$-52 + 44$$

$$-8$$

