2nd Quarterly Exam Review

Unit 3 – Systems

Solve the system of equations using whatever method you'd like.

1. $\begin{cases} y = x-3 \\ y = -x-1 \end{cases}$

$x-3=-x-1$

$2x=2$

$x=1$

$y=1-3$

$y=-2$

$\boxed{(1,-2)}$

2. $\begin{cases} y = x-2 \\ 2x+2y=12 \end{cases}$

$2x+2(x-2)=12$

$2x+2x-4=12$

$4x=16$

$x=4$

$y=4-2$

$y=2$

$\boxed{(4,2)}$

3. $\begin{cases} 5x-4y=30 \\ -5x-y=-5 \end{cases}$

$-5y=25$

$y=-5$

$5x-4(-5)=30$

$5x+20=30$

$5x=10$

$x=2$

$\boxed{(2,-5)}$

4. $\begin{cases} -2x+3y=15 \\ 2\times(x-y=4) \end{cases}$

$2x-2y=8$

$y=23$

$x-23=4$

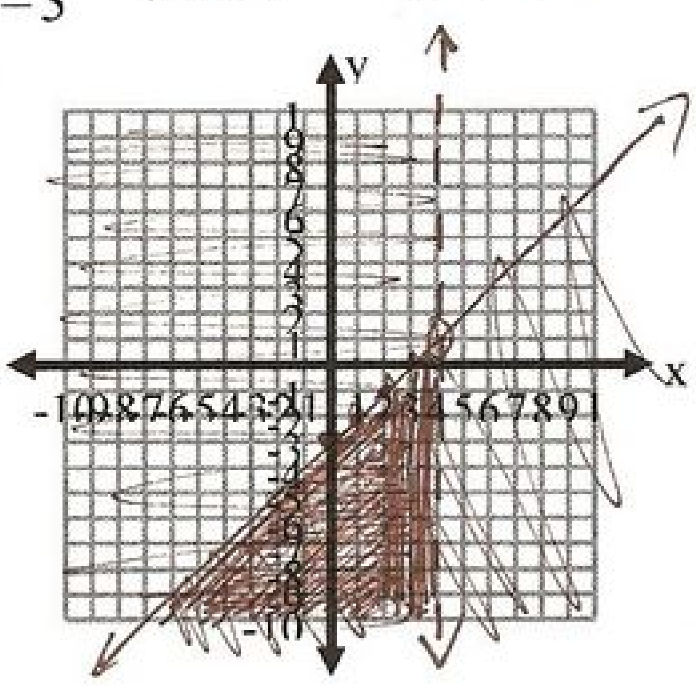
$x=27$

$\boxed{(27,23)}$

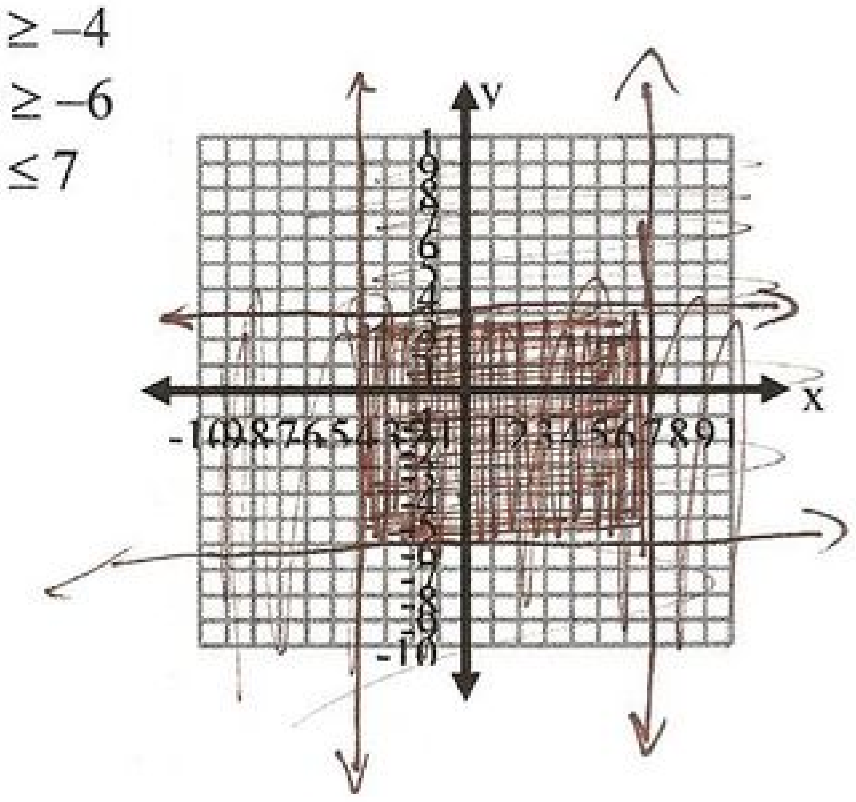
Graph and shade the system of inequalities.

5. $\begin{cases} y \le x-3 \\ x > 4 \end{cases}$

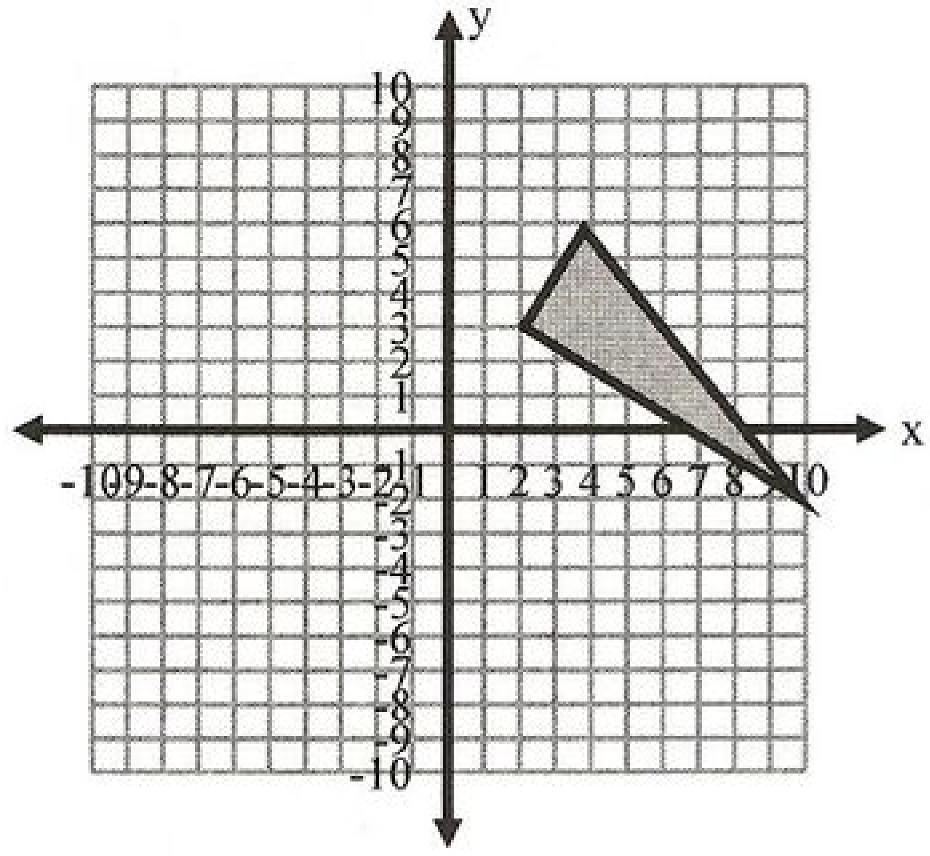
$0 \le 0-3$ $\quad$ $0 \le -3$ FALSE



6. $\begin{cases} y \le 3 \\ x \ge -4 \\ y \ge -6 \\ x \le 7 \end{cases}$



Use the feasible region to the right.



7. Approximate the vertices of the feasible region.

(4,6) (2,3) (10,-2)

ish

8. Find the maximum profit if $P = 5x - 3y$.

$(4,6) \to P = 5(4) - 3(6) = 2$

$(2,3) \to P = 5(2) - 3(3) = 1$

Maximum $\to (10,-2) \to P = 5(10) - 3(-2) = 56$

9. Find the minimum cost if $C = 2x^2 - 4y$.

$(4,6) \to C = 2(4)^2 - 4(6) = 12$

Minimum $\to (2,3) \to C = 2(2)^2 - 4(3) = -4$

$(10,-2) \to C = 2(10)^2 - 4(-2) = 208$

Unit 4 – Matrices

Use matrices A – F to perform the following matrix operations.

$$A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix},\ B = \begin{pmatrix} 5 & 2 \end{pmatrix},\ C = \begin{pmatrix} 6 & 3 \\ -4 & 2 \end{pmatrix},\ D = \begin{pmatrix} -1 \\ 0 \\ -4 \end{pmatrix},\ E = \begin{pmatrix} 5 & 1 & 1 \\ -1 & 2 & -2 \\ 0 & 3 & 7 \end{pmatrix},\ F = \begin{pmatrix} 1 & -2 \\ 4 & -3 \\ -3 & 3 \end{pmatrix}$$

1. $3B$

$\begin{bmatrix} 15 & 6 \end{bmatrix}$

2. $\frac{5}{4}D$

$\begin{bmatrix} -5/4 \\ 0 \\ -5 \end{bmatrix}$

3. $2C - A$

$\begin{bmatrix} 12 & 6 \\ -8 & 4 \end{bmatrix} - \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix} = \boxed{\begin{pmatrix} 9 & 5 \\ -7 & 2 \end{pmatrix}}$

4. $3A + 4C$

$\begin{pmatrix} 9 & 3 \\ -3 & 6 \end{pmatrix} + \begin{pmatrix} 24 & 12 \\ -16 & 8 \end{pmatrix} = \boxed{\begin{pmatrix} 33 & 15 \\ -19 & 14 \end{pmatrix}}$

5. FA

$\begin{pmatrix} 1 & -2 \\ 4 & -3 \\ -3 & 3 \end{pmatrix} \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix} = \boxed{\begin{pmatrix} 5 & -3 \\ 15 & -2 \\ -12 & 3 \end{pmatrix}}$

$3 \times 2 = 2 \times 2$

6. ED

$\begin{pmatrix} 5 & 1 & 1 \\ -1 & 2 & -2 \\ 0 & 3 & 7 \end{pmatrix} \begin{pmatrix} -1 \\ 0 \\ 4 \end{pmatrix} = \boxed{\begin{pmatrix} -1 \\ -7 \\ 28 \end{pmatrix}}$

$3 \times 3 = 3 \times 1$

3×1

7. BC

$\begin{pmatrix} 5 & 2 \end{pmatrix} \begin{pmatrix} 6 & 3 \\ -4 & 2 \end{pmatrix} = \boxed{\begin{pmatrix} 22 & 19 \end{pmatrix}}$

$1 \times 2 = 2 \times 2$

1×2

8. $\det A$

$\begin{vmatrix} 3 & 1 \\ -1 & 2 \end{vmatrix} = 6 - (-1) = 7$

9. $\det E$

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

Down $70 + 0 + -3 = 67$

Up $0 - 30 - 7 = -37$

$67 - -37 = 104$

Solve the system using Cramer's Rule.

10. $\begin{cases} 2x+y=5 \\ x+6y=-25 \end{cases}$

$\text{Det} = \begin{vmatrix} 2 & 1 \\ 1 & 6 \end{vmatrix}$ $12-1=11$

$x = \begin{vmatrix} 5 & 1 \\ -25 & 6 \end{vmatrix} = 30 - -25 = \frac{55}{11} = 5$

$y = \begin{vmatrix} 2 & 5 \\ 1 & -25 \end{vmatrix} = -50-5 = \frac{-55}{11} = -5$

$\boxed{(5,-5)}$

11. $\begin{cases} 2x-y-3z=-5 \\ x+y-2z=3 \\ -x+4z=10 \end{cases}$

$\text{Det} \begin{vmatrix} 2 & -1 & -3 \\ 1 & 1 & -2 \\ -1 & 0 & 4 \end{vmatrix} \begin{matrix} 2 & -1 \\ 1 & 1 \\ -1 & 0 \end{matrix}$

$8 + -2 + 0 = 6$

$3 + 0 - 4 = -1$

$6 - -1 = 7$

$x = \begin{vmatrix} -5 & -1 & -3 \\ 3 & 1 & -2 \\ 10 & 0 & 4 \end{vmatrix} \begin{matrix} -5 & -1 \\ 3 & 1 \\ 10 & 0 \end{matrix}$

Down: $-20 + 20 + 0 = 0$

Up: $-30 + 0 - 12 = -42$

$0 - -42 = \frac{42}{7} = 6$

$y = \begin{vmatrix} 2 & -5 & -3 \\ 1 & 3 & -2 \\ -1 & 10 & 4 \end{vmatrix} \begin{matrix} 2 & -5 \\ 1 & 3 \\ -1 & 10 \end{matrix}$

Down: $24 + -10 + -30 = -16$

Up: $9 - 40 - 20 = -51$

$-16 - -51 = \frac{35}{7} = 5$

$z = \begin{vmatrix} 2 & -1 & -5 \\ 1 & 1 & 3 \\ -1 & 0 & 10 \end{vmatrix} \begin{matrix} 2 & -1 \\ 1 & 1 \\ -1 & 0 \end{matrix}$

Down: $20 + 3 + 0 = 23$

Up: $5 + 0 + -10 = -5$

$23 - -5 = \frac{28}{7} = 4$

$x=6$
$y=5$
$z=4$

Chapter 5 – Quadratic Formulas

Graph the quadratic function. Label the vertex, axis of symmetry, *y*-intercept, *x*-intercepts and a symmetric point on the graph.

1. $y = 2(x-3)^2 + 5$

Vertex Form

V: $(3,5)$

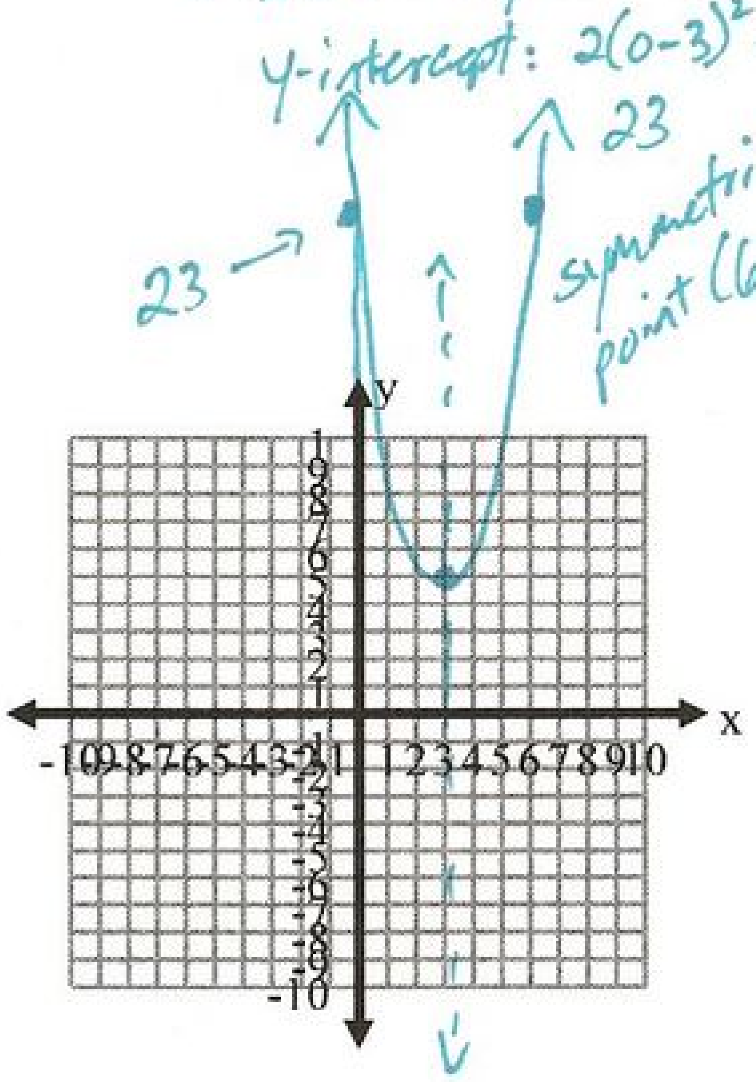
Axis of Symmetry: $x=3$

y-intercept: $2(0-3)^2+5$

23

23

symmetric point $(6,23)$



$x=3$

2. $y = \frac{-1}{2}(x-5)(x+1)$

Intercept Form

x-int: $5, -1$

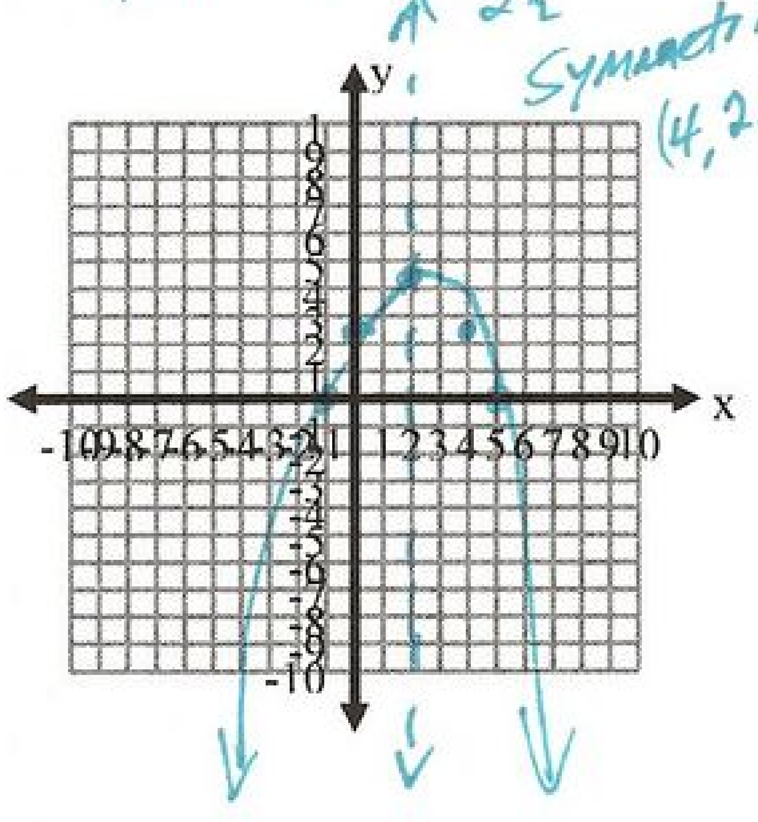
x-coord. of Vertex: $\frac{5+-1}{2} = 2$

Ax. of Symm: $x=2$

y-coord. of Vertex: $\frac{-1}{2}(2-5)(2+1)$ $4\frac{1}{2}$

y-intercept: $\frac{-1}{2}(0-5)(0+1)$ $2\frac{1}{2}$

Symmetric pt. $(4, 2.5)$



3. $y = x^2 + 5x + 6$

Standard form

y-intercept

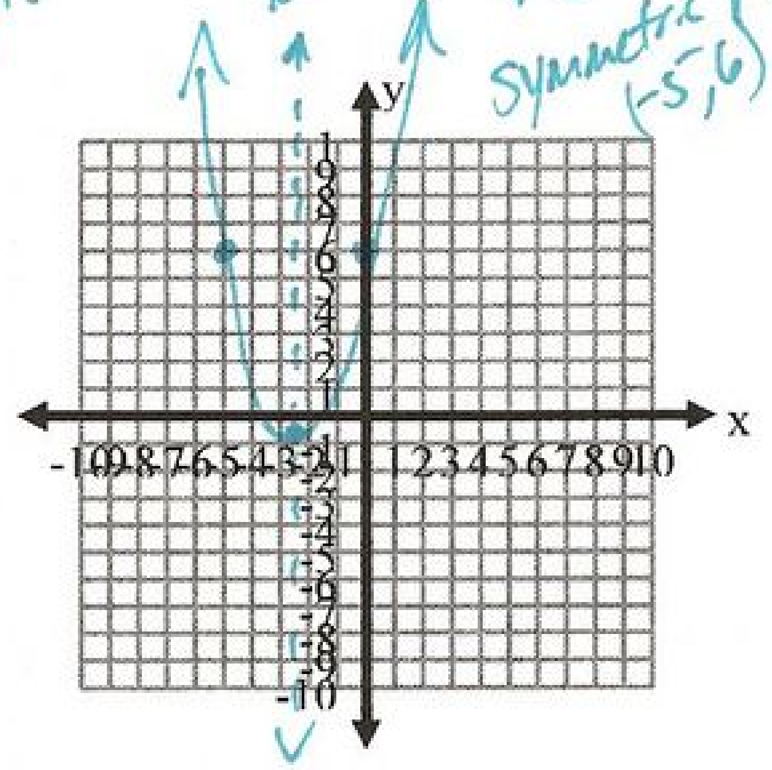
$\frac{-b}{2a} = \frac{-5}{2(1)} = -2.5$

$(-2\frac{1}{2})^2 + 5(-2.5) + 6 = -0.25$

$x=-2.5$

$V(-2.5, -0.25)$

Symmetric Pt $(-5, 6)$



Solve the quadratic equation using square roots.

4. $2x^2 - 19 = 79$

$+19 \quad +19$

$\frac{2x^2}{2} = \frac{98}{2}$

$\sqrt{x^2} = \sqrt{49}$

$x = \pm 7$

5. $3(x+1)^2 + 1 = 508$

$-1 \quad -1$

$\frac{3(x+1)^2}{3} = \frac{507}{3}$

$\sqrt{(x+1)^2} = \sqrt{169}$

$x+1 = \pm 13$

$x+1=13 \qquad x+1=-13$

$x=12 \qquad x=-14$

6. $-3x^2 + 10 = 37$

$-10 \quad -10$

$\frac{-3x^2}{-3} = \frac{27}{-3}$

$\sqrt{x^2} = \sqrt{-9}$

$x = \pm 3i$

Solve the quadratic equation using quadratic formula.

7. $x^2 + 5x - 6 = 0$

$a=1$

$b=5$

$c=-6$

$D = 5^2 - 4(1)(-6) = 49$

2 Real Solutions

$x = \frac{-5 \pm \sqrt{5^2-4(1)(-6)}}{2(1)}$

$x = \frac{-5 \pm \sqrt{49}}{2} \rightarrow \frac{-5 \pm 7}{2}$

$\frac{-5+7}{2} = 1 \qquad \frac{-5-7}{2} = -6$

8. $-2x^2 - 6x - 4 = 0$

$a=-2$

$b=-6$

$c=-4$

$D = (-6)^2 - 4(-2)(-4) = 4$

2 Real Solutions

$x = \frac{-(-6) \pm \sqrt{(-6)^2-4(-2)(-4)}}{2(-2)}$

$\sqrt{4} = 2$

$x = \frac{6 \pm 2}{-4}$

$\frac{6+2}{-4} = -1 \qquad \frac{6-2}{-4} = -2$

13. A test has twenty questions worth 120 points. The test consists of True/False questions worth 5 points each and multiple choice questions worth 7 points each. How many multiple choice questions are on the test? How many true and false questions are there on the test?

T = # of T/F Questions   M = # Multiple-Choice Questions

$-5 \times (T + M = 20)$

$5T + 7M = 120$

$-5T - 5M = -100$

$\frac{2M}{2} = \frac{20}{2}$

$M = 10$

10 multiple-choice questions

∴

10 True/False Questions

14. Carlos Beltran, the Centerfielder for the New York Mets, throws a baseball from the Centerfield wall to home plate in the shape of a parabola. The path of the ball can be modeled by the equation $h(x) = -0.0015(x-200)^2 + 65$.

a. How far off the ground is the ball before Beltran throws it (find the y-intercept)?

$-0.0015(0-200)^2 + 65 = 5$

b. What is the maximum height of the ball (identify the y-coordinate of the vertex)?

65

c. At what point would the ball be the same height off the ground as it was before Beltran threw it (find a symmetric point on the curve from y-intercept)?

400 ft

d. Graph the path of the curve.

Vertex (200,65)