

AA34 Unit 1 Solving Review

1. a) $\begin{cases} 6x - 2y = -4 \\ y = 3x + 2 \end{cases}$

$6x - 2(3x + 2) = -4$
 $6x - 6x - 4 = -4$
 $-4 = -4$ true!

all real numbers
all solutions

b) $\begin{cases} x + y = -2 \\ y = 4x - 7 \end{cases}$

$x + (4x - 7) = -2$
 $x + 4x - 7 = -2$
 $5x - 7 = -2$
 $5x = 5$
 $x = 1$

$y = 4(1) - 7$
 $y = 4 - 7$
 $y = -3$
 (1, -3)

c) $\begin{cases} 5x + y = 8 \\ -3x + 2y = -10 \end{cases} \cdot 2$

$-10x - 2y = -16$
 $+ \quad -3x + 2y = -10$

 $-13x = -26$
 $x = 2$

$5(2) + y = 8$
 $10 + y = 8$
 $y = -2$
 (2, -2)

d) $\begin{cases} 4x^2 + y^2 = 13 \\ (x^2 + y^2 = 10) \cdot -1 \end{cases}$

$4x^2 + y^2 = 13$
 $+ \quad -x^2 - y^2 = -10$

 $3x^2 = 3$
 $x^2 = 1$
 $x = \pm 1$

$(-1)^2 + y^2 = 10$
 $1 + y^2 = 10$
 $y^2 = 9$
 $y = \pm 3$

$(1)^2 + y^2 = 10$
 $1 + y^2 = 10$
 $y^2 = 9$
 $y = \pm 3$

(-1, 3) (-1, -3) (1, 3) (1, -3)

e) $\begin{cases} y = x^2 + 4x + 5 \\ y = x^2 + 2x - 1 \end{cases}$

$x^2 + 4x + 5 = x^2 + 2x - 1$
 $4x + 5 = 2x - 1$
 $2x + 5 = -1$
 $2x = -6$
 $x = -3$

$y = (-3)^2 + 4(-3) + 5$
 $y = 9 - 12 + 5$
 $y = 2$
 (-3, 2)

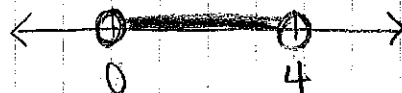
2. a) $\sqrt{2x+5} = \sqrt{3x-1}$
 $2x+5 = 3x-1$
 $5 = x-1$
 $6 = x$

b) $4(x-2)^2 + 9 < 25$
 $4(x-2)^2 < 16$
 $(x-2)^2 < 4$

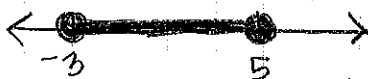
$x-2 > 2$
 $x > 4$
 $x < 4$

$x-2 < -2$
 $x < 0$
 $x > 0$

test $x=1$
 $4(1-2)^2 + 9 < 25$
 $4(1) + 9 < 25$
 $13 < 25$
 true



b) $-2|x-1| + 3 \geq -5$
 $-2|x-1| \geq -8$
 $|x-1| \leq 4$
 $x-1 \leq 4$
 $x \leq 5$
 $x-1 \geq -4$
 $x \geq -3$



d) $\frac{5}{2x} + \frac{3}{4x^2} = \frac{2}{3x}$ goal denom = $12x^2$

$$\frac{5 \cdot 6x}{2x \cdot 6x} + \frac{3 \cdot 3}{4x^2 \cdot 3} = \frac{2 \cdot 4x}{3x \cdot 4x}$$

$$\frac{30x}{12x^2} + \frac{9}{12x^2} = \frac{8x}{12x^2}$$

$$30x + 9 = 8x$$

$$9 = -22x$$

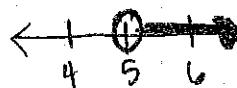
$$-\frac{9}{22} = x$$

e) $\sqrt{x-4} + 3 > 4$

$$\sqrt{x-4} > 1$$

$$x-4 > 1$$

$$x > 5$$



f) $3|3-5x| - 3 = 18$

$$3|3-5x| = 21$$

$$|3-5x| = 7$$

$$3-5x = 7 \quad 3-5x = -7$$

$$-5x = 4 \quad -5x = -10$$

$$x = -\frac{4}{5} \quad x = 2$$

g) $27 - 2(x-1)^2 = 9$

$$-2(x-1)^2 = -18$$

$$(x-1)^2 = 9$$

$$x-1 = 3$$

$$x-1 = -3$$

$$x = 4$$

$$x = -2$$

h) $\frac{x-3}{7} = \frac{4x+12}{7}$

$$7(x-3) = 7(4x+12)$$

$$7x-21 = 28x+84$$

$$-21 = 21x+84$$

$$-105 = 21x$$

$$-5 = x$$

i) $3(2x-1) + 12 = 4x-3$

$$6x-3+12 = 4x-3$$

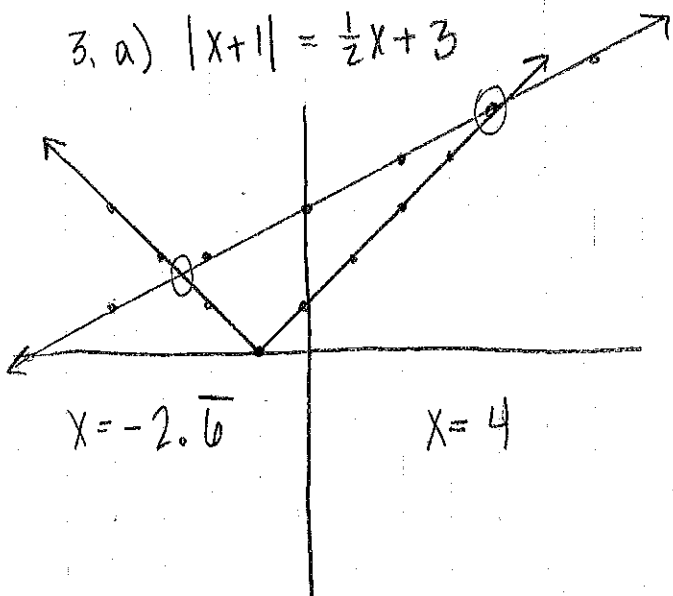
$$6x+9 = 4x-3$$

$$2x+9 = -3$$

$$2x = -12$$

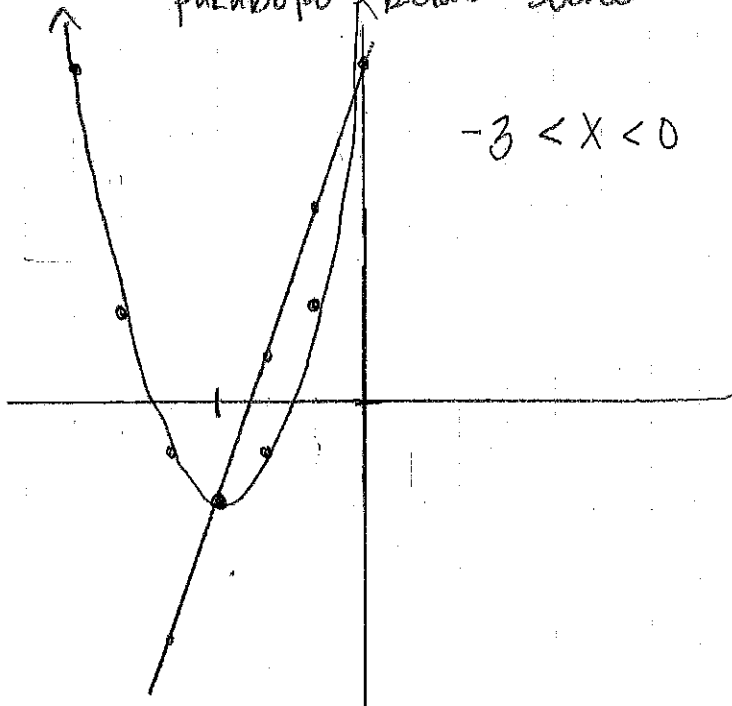
$$x = -6$$

3. a) $|x+1| = \frac{1}{2}x + 3$



b) $(x+3)^2 - 2 < 3x+7$

parabola below line



$$-3 < x < 0$$

$$4. a) \begin{cases} y < -x-2 \\ y > x+1 \end{cases}$$

$$y < -x-2 \quad \text{test } (0,0)$$

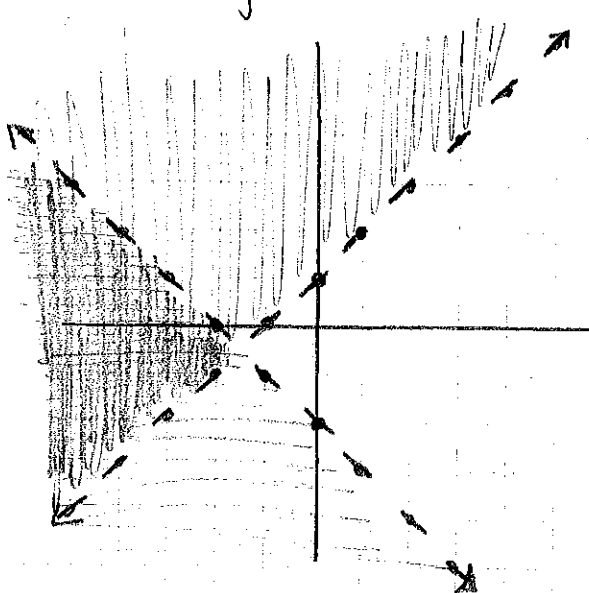
$$0 < -0-2$$

$$0 < -2 \quad \text{false}$$

$$y > x+1 \quad \text{test } (0,0)$$

$$0 > 0+1$$

$$0 > 1 \quad \text{false}$$



$$b) \begin{cases} 2x+3y-9 \geq 0 \\ x+y-6 < 0 \end{cases}$$

$$3y \geq -2x+9$$

$$y < -x+6$$

$$\begin{cases} y \geq -\frac{2}{3}x+3 \\ y < -x+6 \end{cases}$$

$$y \geq -\frac{2}{3}x+3 \quad \text{test } (0,0)$$

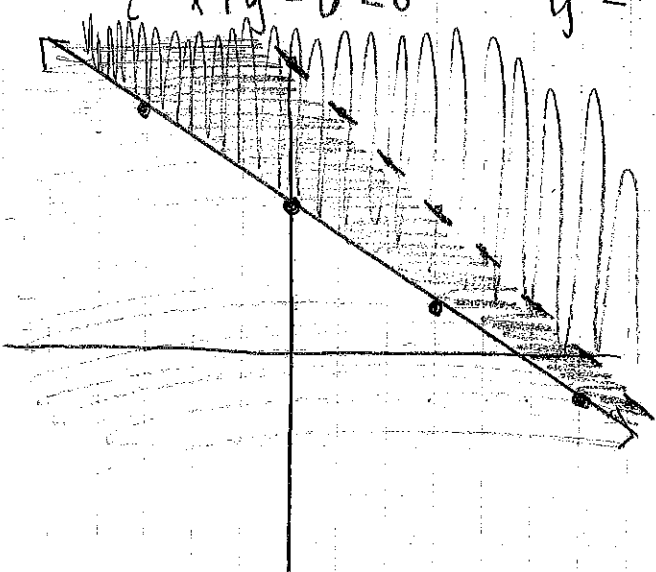
$$0 \geq -\frac{2}{3}(0)+3$$

$$0 \geq 3 \quad \text{false}$$

$$y < -x+6 \quad \text{test } (0,0)$$

$$0 < -0+6$$

$$0 < 6 \quad \text{true}$$



$$c) \begin{cases} x-y < -3 \\ y \geq x^2+1 \end{cases}$$

$$-y < -x-3$$

$$y \geq x^2+1$$

$$\begin{cases} y > x+3 \\ y \geq x^2+1 \end{cases}$$

$$y > x+3 \quad \text{test } (0,0)$$

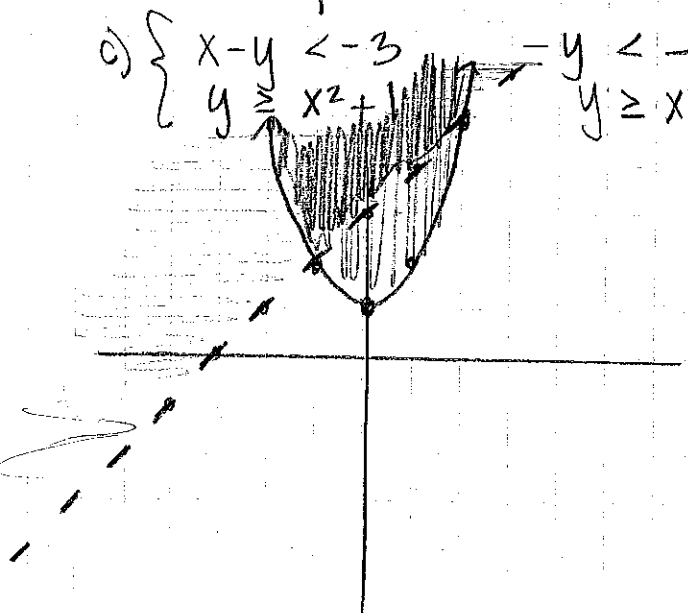
$$0 > 0+3$$

$$0 > 3 \quad \text{false}$$

$$y \geq x^2+1 \quad \text{test } (0,0)$$

$$0 \geq 0^2+1$$

$$0 \geq 1 \quad \text{false}$$



$$5. a) \begin{cases} 2x + y = 25 \\ 3x - y = 20 \end{cases}$$

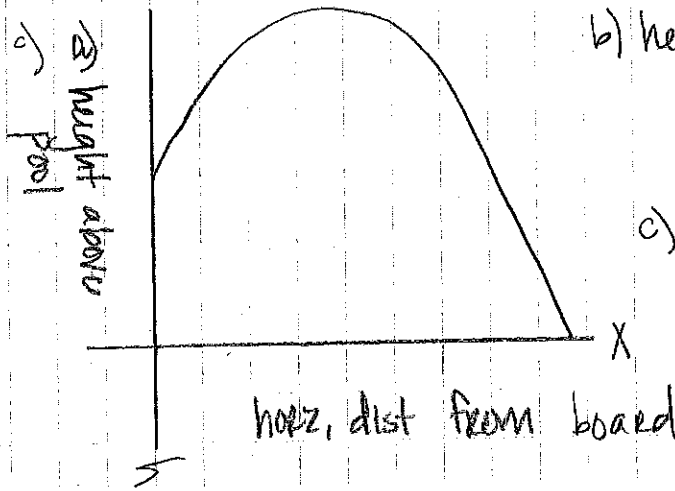
$$\begin{array}{r} 2x + y = 25 \\ + 3x - y = 20 \\ \hline 5x = 45 \\ x = 9 \end{array}$$

$$\begin{array}{r} 2(9) + y = 25 \\ 18 + y = 25 \\ y = 7 \end{array} \quad (9, 7)$$

b) cody: $2g + 4h = 43$
 taxi: $(2g + 2h = 30) \cdot -1$

$$\begin{array}{r} 2g + 4h = 43 \\ -2g - 2h = -30 \\ \hline 2h = 13 \\ h = 6.5 \\ \text{hats } \$6.50 \end{array}$$

$$\begin{array}{r} 2g + 4(6.5) = 43 \\ 2g + 26 = 43 \\ 2g = 17 \\ g = 8.5 \\ \text{gloves } \$8.50 \end{array}$$



b) height of diving board when $x=0$

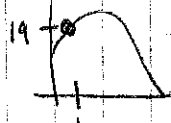
$$h(0) = -(0-3)^2 + 23 = 14 \text{ feet above water}$$

c) land in water when $h=0$

$$\begin{array}{r} 0 = -(x-3)^2 + 23 \\ -23 = -(x-3)^2 \\ 23 = (x-3)^2 \\ 4.796 = x-3 \\ 7.796 = x \\ \text{feet away} \end{array} \quad \begin{array}{r} -4.796 = x-3 \\ -1.796 = x \end{array}$$

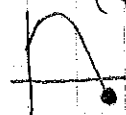
d) $x=1$ $h(x) = -(1-3)^2 + 23 = 19$

when 1 foot away, 19 feet in air



e) $x=8$ $h(x) = -(8-3)^2 + 23 = -2$

when 8 feet away, -2 feet in air (so 2 feet under water)



f) 22 feet in air = h

$$\begin{array}{r} 22 = -(x-3)^2 + 23 \\ -1 = -(x-3)^2 \end{array}$$

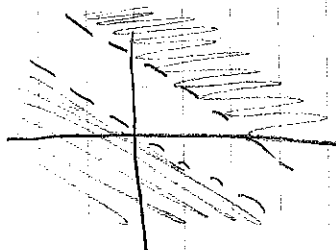
$$\begin{array}{r} 1 = (x-3)^2 \\ 1 = x-3 \quad -1 = x-3 \end{array} \quad \begin{array}{r} 4 = x \\ 2 = x \end{array} \quad \begin{array}{r} \text{away} \\ \text{feet away} \end{array}$$

g) 25 feet in air = h

$$\begin{array}{r} 25 = -(x-3)^2 + 23 \\ 2 = -(x-3)^2 \end{array}$$

$-2 = (x-3)^2$
 no solution - doesn't reach 25 ft in air

h) YES, system of inequalities with no solutions



When equations are parallel and opposite shading