Math 32 high school Step 149

12-2-18
12-6-18
12-7-18
12-10-18
12-12-18
12-14-18
12-16-18
12-22-18
12-24-18
01-07-19
01-13-19
01-15-19
01-15-19

① $4(4x-3) = 17x$

$16x - 12 = 17x$

$16x - 12 + 12 = 17x + 12$

$16x = 17x + 12$

$16x - 17x = 17x + 12 - 17x$

$-1x = 12$

$\frac{-1x}{-1} = \frac{12}{-1}$

$x = -12$

② $-2y - 9 = 4y + 9$

$-2y - 9 + 9 = 4y + 9 + 9$

$-2y = 4y + 18$

$-2y - 4y = 4y + 18 - 4y$

$-6y = 18$

$\frac{-6y}{-6} = \frac{18}{-6}$

$y = -3$

3. $\frac{x}{7} = \frac{x}{14} + \frac{1}{2}$ LCD = 14

$\frac{x}{7}(14) = \frac{x}{14}(14) + \frac{1}{2}(14)$

$x(2) = x(1) + 1(7)$

$2x = 1x + 7$

$2x - 1x = 1x + 7 - 1x$

$1x = 7$

$x = 7$

4. $-2.6x + 2.4 = -10.6$

$-2.6x + 2.4 - 2.4 = -10.6 - 2.4$

$-2.6x = -13$

$\frac{-2.6x}{-2.6} = \frac{-13}{-2.6}$

$x = 5$

(5) $3(x + 2.55) = 2x$

$3x + 7.65 = 2x$

$3x + 7.65 - 7.65 = 2x - 7.65$

$3x = 2x - 7.65$

$3x - 2x = 2x - 7.65 - 2x$

$1x = -7.65$

$x = -7.65$

(6.) $4(2x - 1.4) = 4x - 5.6$

$8x - 5.6 = 4x - 5.6$

$8x - 5.6 + 5.6 = 4x - 5.6 + 5.6$

$8x = 4x$

$8x - 4x = 4x - 4x$

$4x = 0$

$\frac{4x}{4} = \frac{0}{4}$

$x = 0$

(1.) Find the total amount in the compound interest account.

$2700 is compounded annually at a rate of 7% for 1 year.

$A = P\left(1 + \frac{r}{N}\right)^{Nt}$

$A = \$2700\left(1 + \frac{.07}{1}\right)^{1(1)}$

$A = \$2700(1 + .07)^{1}$

$A = \$2700(1.07)$

$A = \$2889.00$

$P = \$2700$

$r = 7\% = .07$

annually = 1

year = 1

(8.) Find the total amount in the compound interest account. $2000 is compounded annually at a rate of 11% for 3 years

$P = 2000$

$r = 11\% = .11$

annually = 1

years = 3

$$A = P\left(1 + \frac{r}{N}\right)^{Nt}$$

$$A = 2000\left(1 + \frac{.11}{1}\right)^{1(3)}$$

$$A = 2000(1 + .11)^{3}$$

$$A = 2000(1.11)^{3}$$

$$A = 2000(1.11)(1.11)(1.11)$$

$$A = 2000(1.367631)$$

$$A = 2735.262$$

$$A = 2735.26$$

(9) $5x < -20$

$\frac{5x}{5} < \frac{-20}{5}$

$x < -4$

divide by a positive so do not turn the alligator around

$(-\infty, -4)$

(10.) $-7x \leq 28$

$\frac{-7x}{-7} \geq \frac{28}{-7}$

divide by a negative and turn the alligator around

$x \geq -4$

$[-4, \infty)$

(11) $4x - 7 < 8x + 5$

$4x - 7 + 7 < 8x + 5 + 7$

$4x < 8x + 12$

$4x - 8x < 8x + 12 - 8x$

$-4x < 12$

$\frac{-4x}{-4} > \frac{12}{-4}$

divide by a negative and turn the alligator around

$x > -3$

$(-3, \infty)$

(12) $-6x + 4 \geq 4(3 - x)$

$-6x + 4 \geq 12 - 4x$

$-6x + 4 - 4 \geq 12 - 4x - 4$

$-6x \geq -4x + 8$

$-6x + 4x \geq -4x + 8 + 4x$

$-2x \geq 8$

$\frac{-2x}{-2} \leq \frac{8}{-2}$

$x \leq -4$

$(-\infty, -4]$

(13.) Graph

$x - y = 3$

$x - (0) = 3$

$x - 0 = 3$

$x = 3$

x	y
	0
1	
	-1

x	y
3	0
1	-2
2	-1

$x - y = 3$

$(1) - y = 3$

$1 - y = 3$

$x - y + 1 = 3 - 1$

$-y = 2$

$\frac{-y}{-1} = \frac{2}{-1}$

$y = -2$

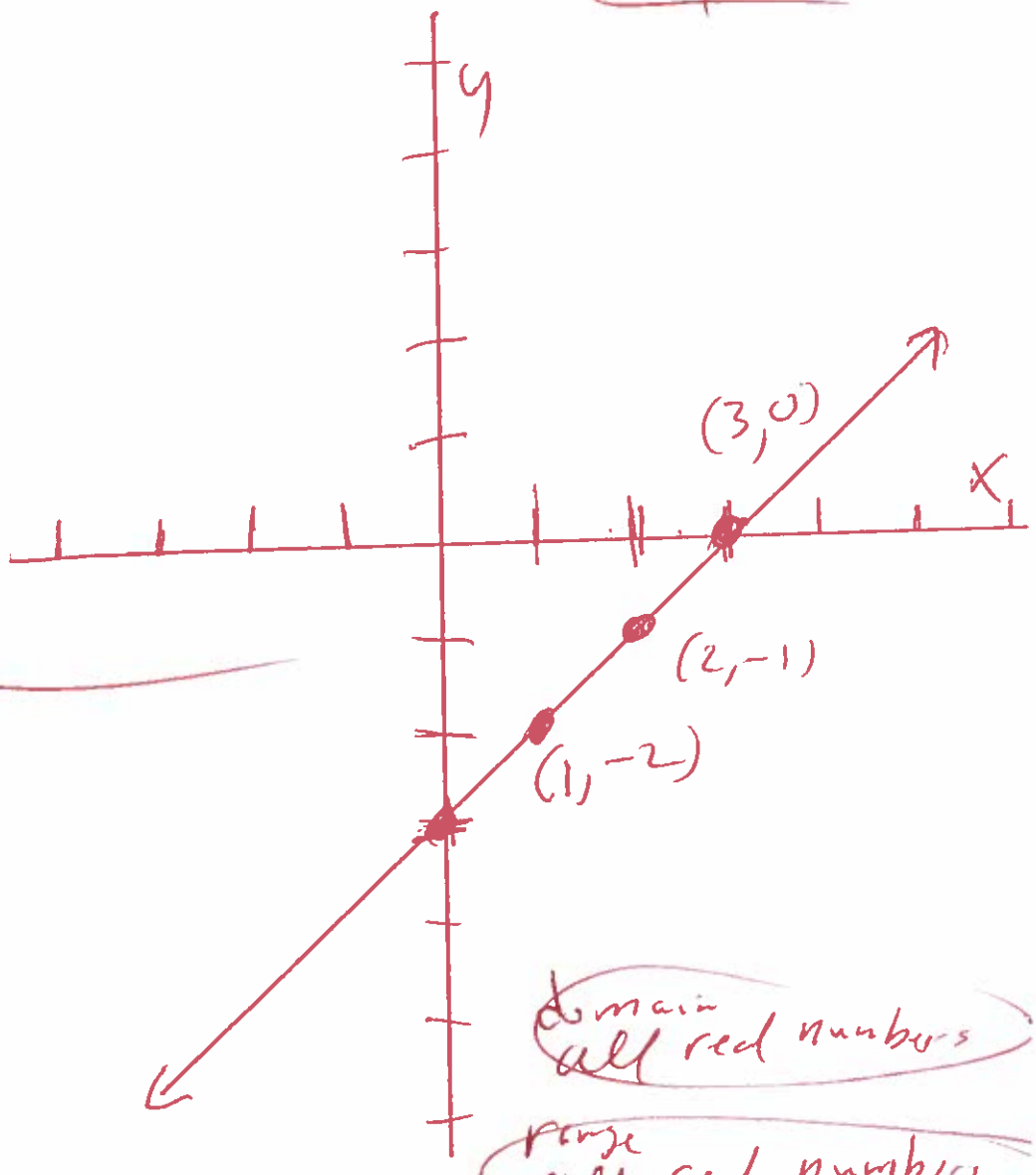
$x - y = 3$

$x - (-1) = 3$

$x + 1 = 3$

$x + 1 - 1 = 3 - 1$

$x = 2$



domain: all real numbers

range: all real numbers

(14.) graph

$y = 4x$

x	y
-1	-4
0	0
1	4

$y = 4(-1)$

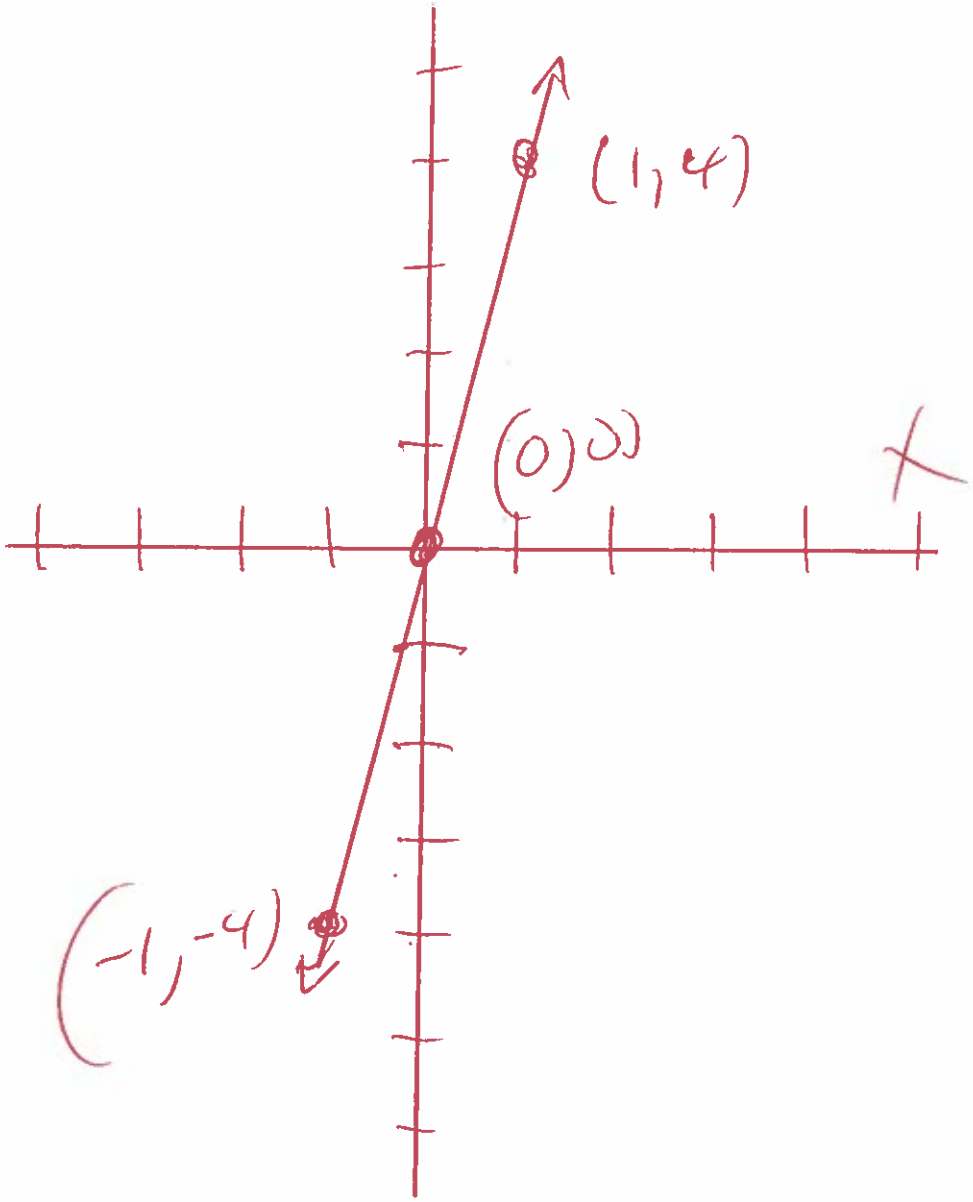
$y = -4$

$y = 4(0)$

$y = 0$

$y = 4(1)$

$y = 4$



domain all real numbers

range all real numbers

15. graph

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

x	y
-8	-2
0	0
8	2

$y = \frac{1}{4}(-8)$

$y = \frac{-8}{4}$

$y = -2$

$y = \frac{1}{4}(0)$

$y = \frac{0}{4}$

$y = 0$

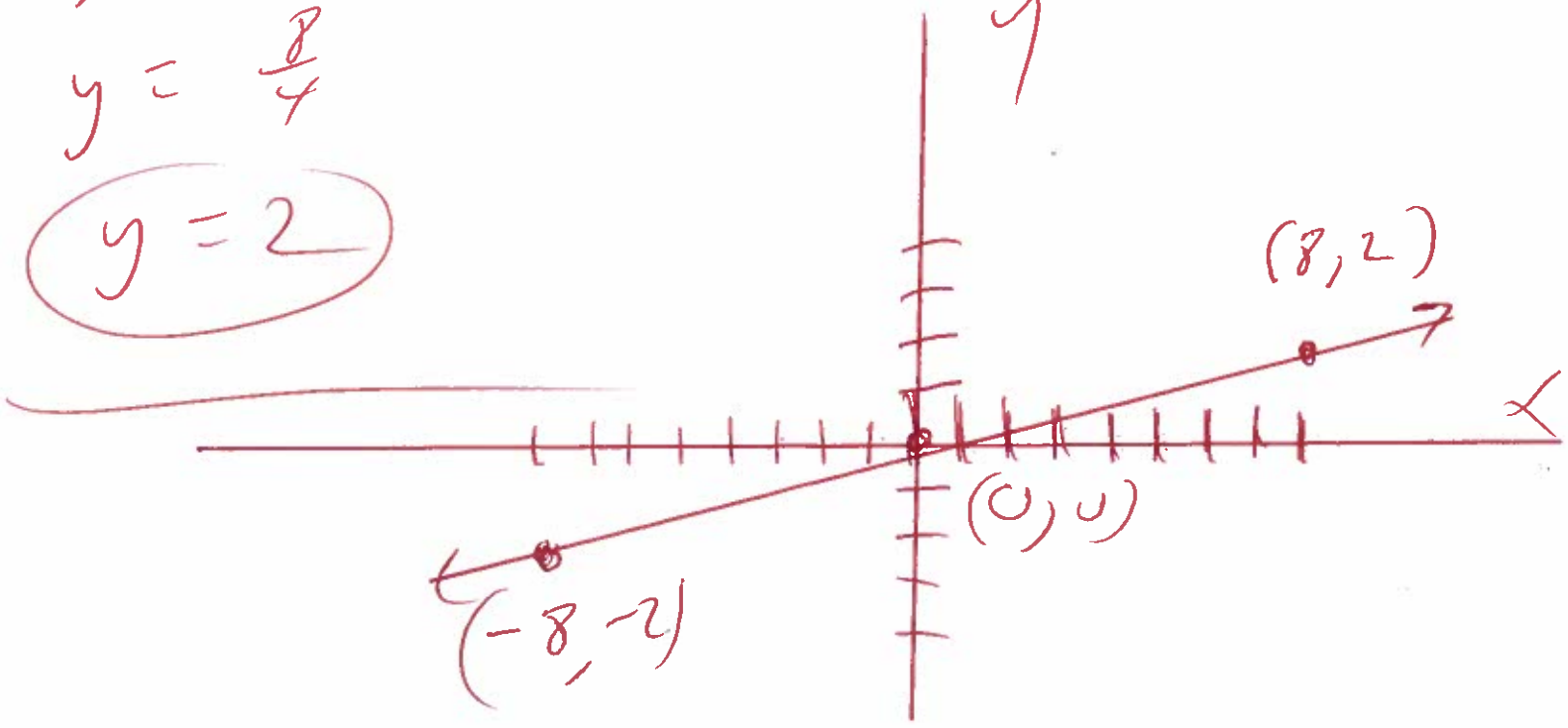
$y = \frac{1}{4}(8)$

$y = \frac{8}{4}$

$y = 2$

domain
all real numbers

range
all real numbers



(16) Graph

$y = -2x + 7$

$y = -2(0) + 7$

$y = 0 + 7$

$y = 7$

$y = -2(1) + 7$

$y = -2 + 7$

$y = 5$

$y = -2(2) + 7$

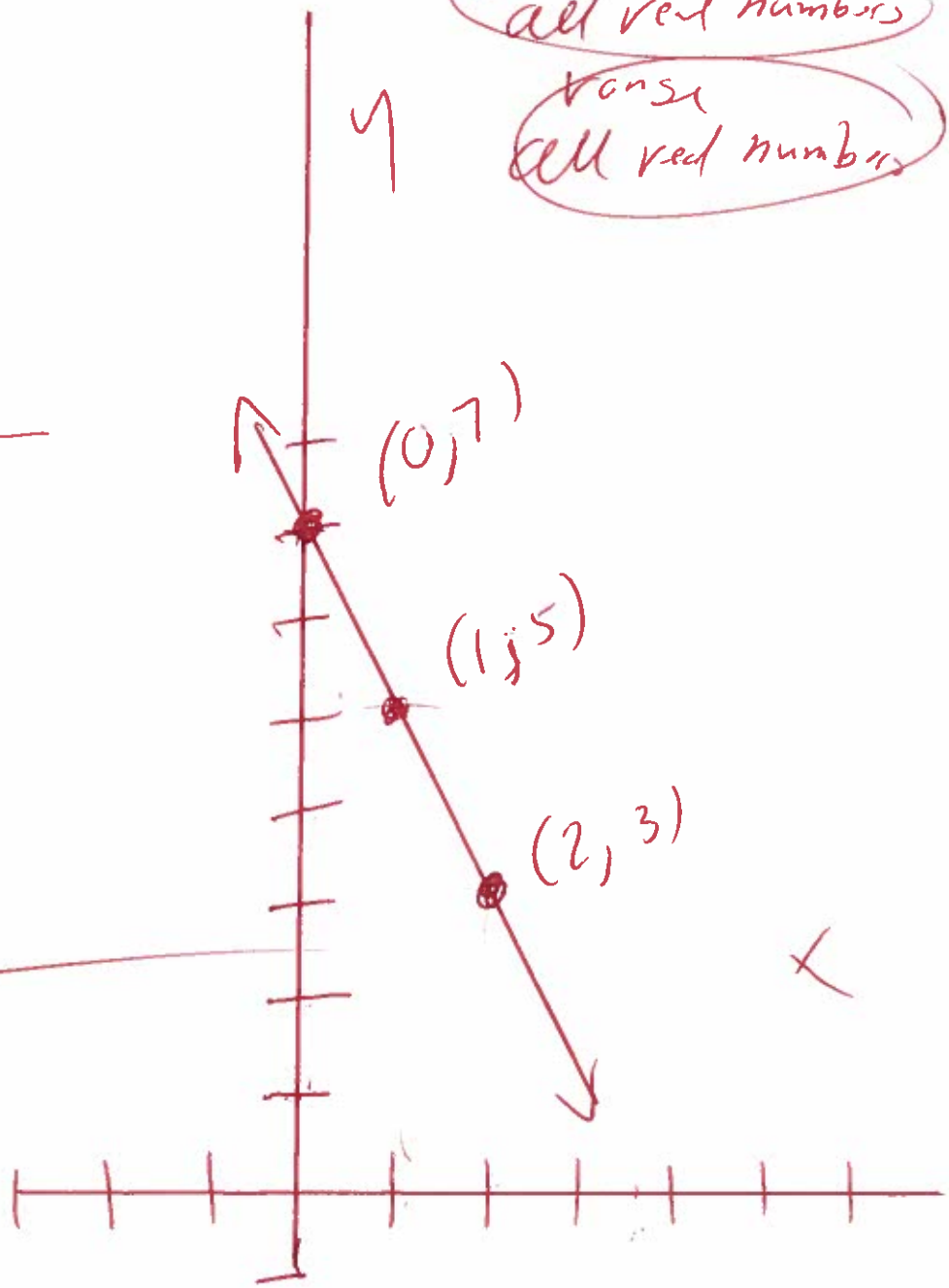
$y = -4 + 7$

$y = 3$

x	y
0	7
1	5
2	3

domain
all real numbers

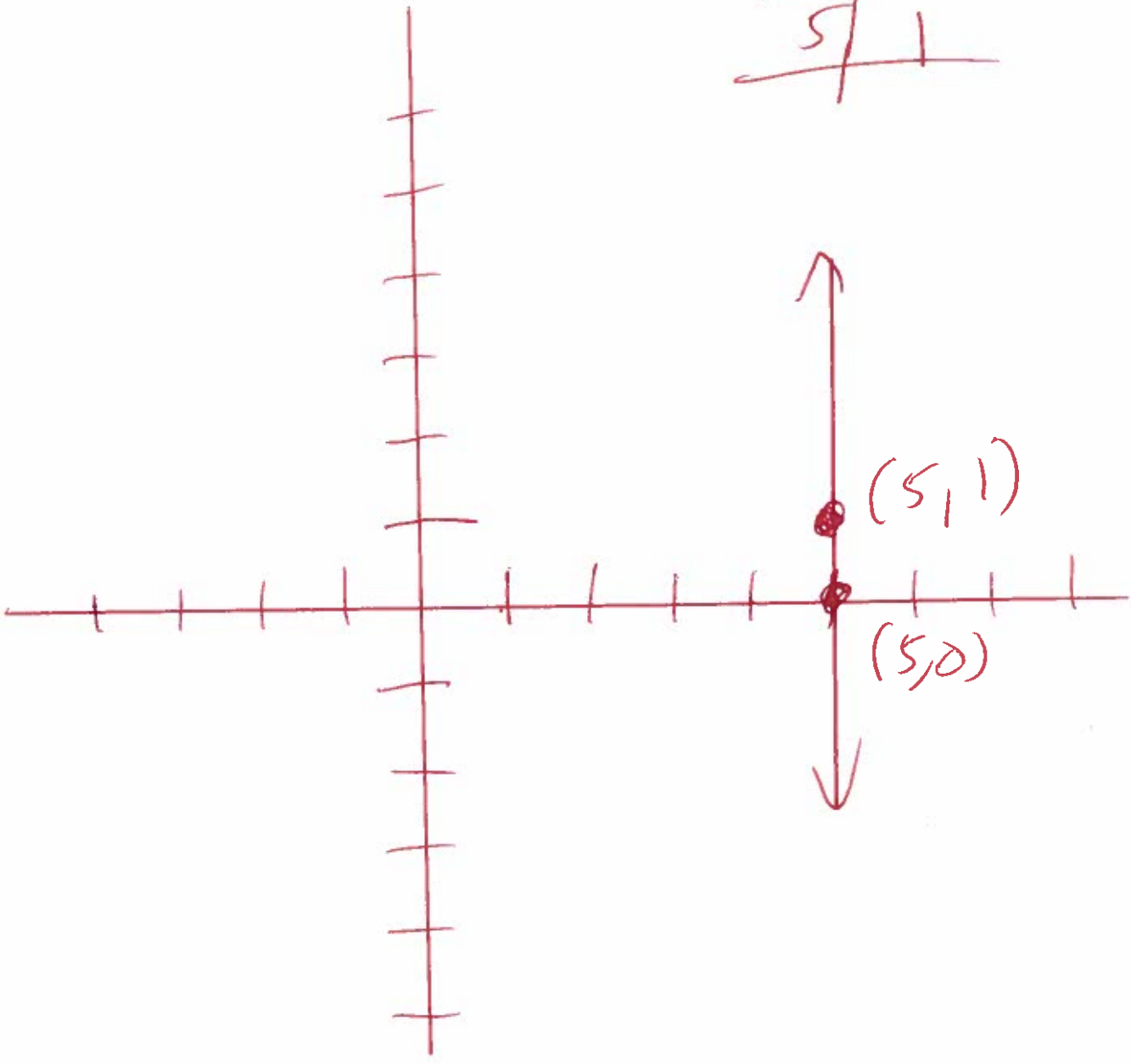
range
all real numbers



(17) graph

$x = 5$

x	y
5	0
5	1



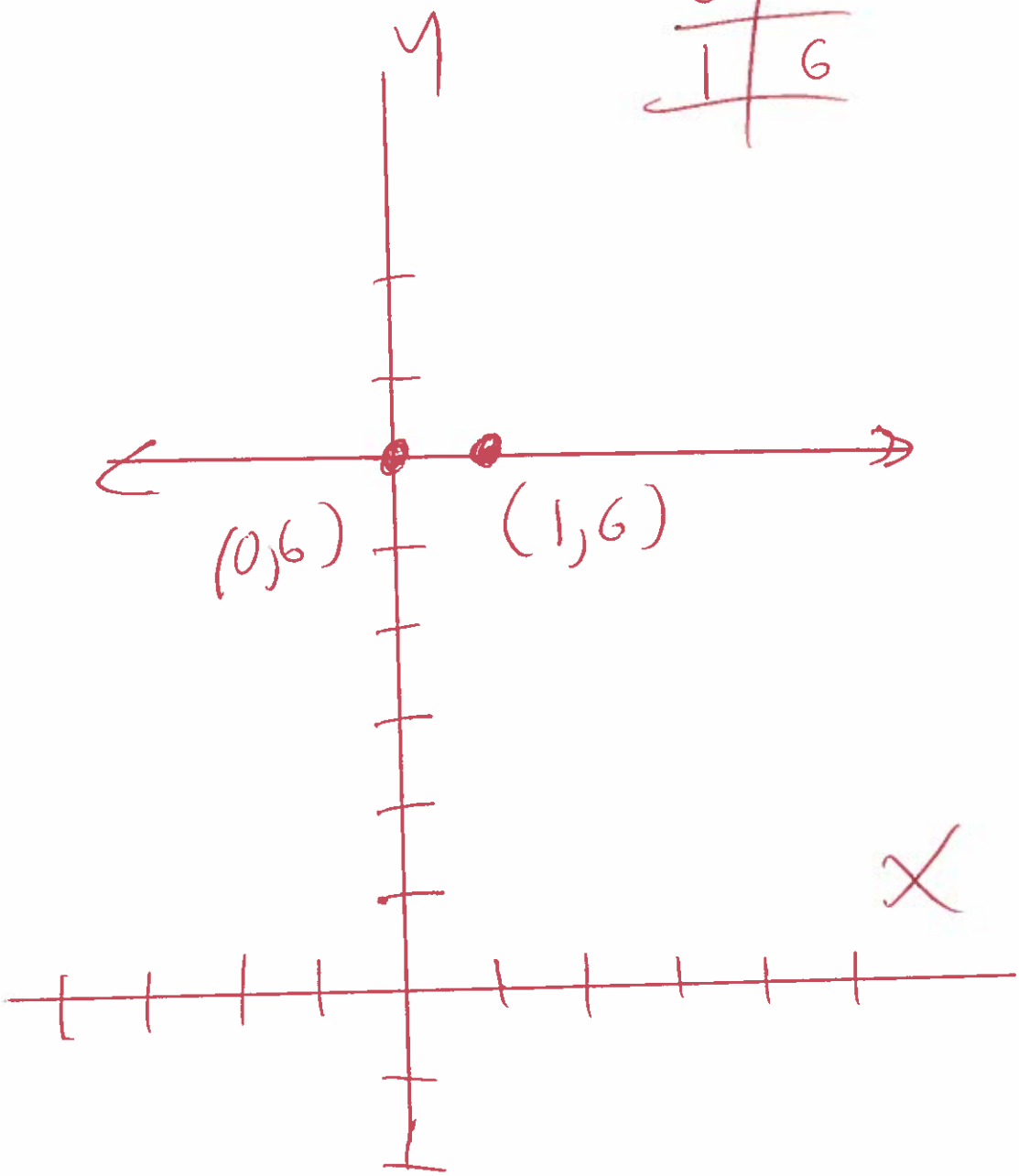
domain $\{5\}$

range all real numbers

(18.) Graph

$y = 6$

x	y
0	6
1	6



domain all real numbers

range {6}

(19) graph

$x + 3y = -6$

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

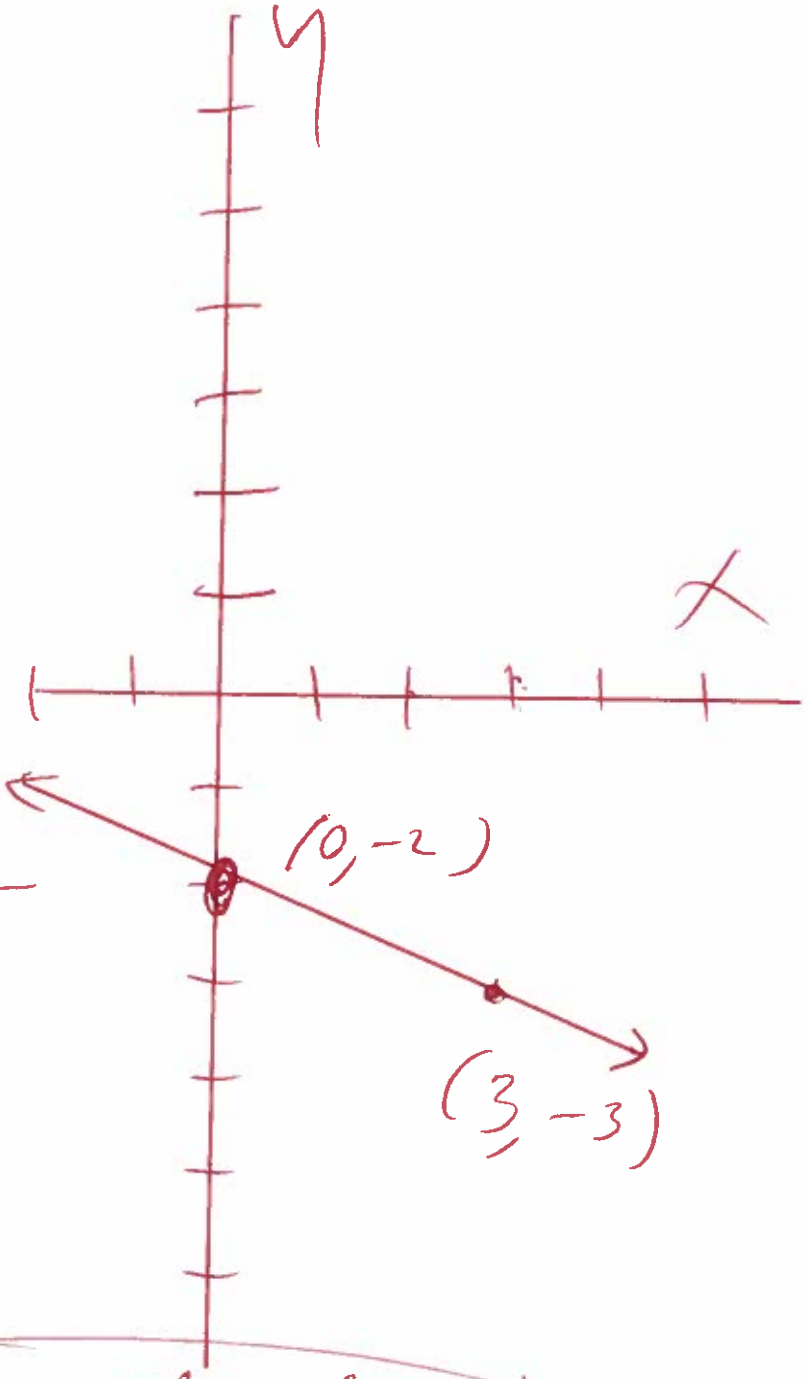
$3y = -6 - x$

$\frac{3y}{3} = \frac{-6}{3} - \frac{x}{3}$

$y = -2 - \frac{1}{3}x$

$y = -\frac{1}{3}x - 2$

x	y
0	-2
3	-3



$y = -\frac{1}{3}(0) - 2$

$y = 0 - 2$

$y = -2$

$y = -\frac{1}{3}(3) - 2$

$y = -1 - 2$

$y = -3$

domain all real numbers

range all real numbers

(20.) graph

$y = -\frac{1}{2}x - 1$

x	y
0	-1
2	-2

$y = -\frac{1}{2}(0) - 1$

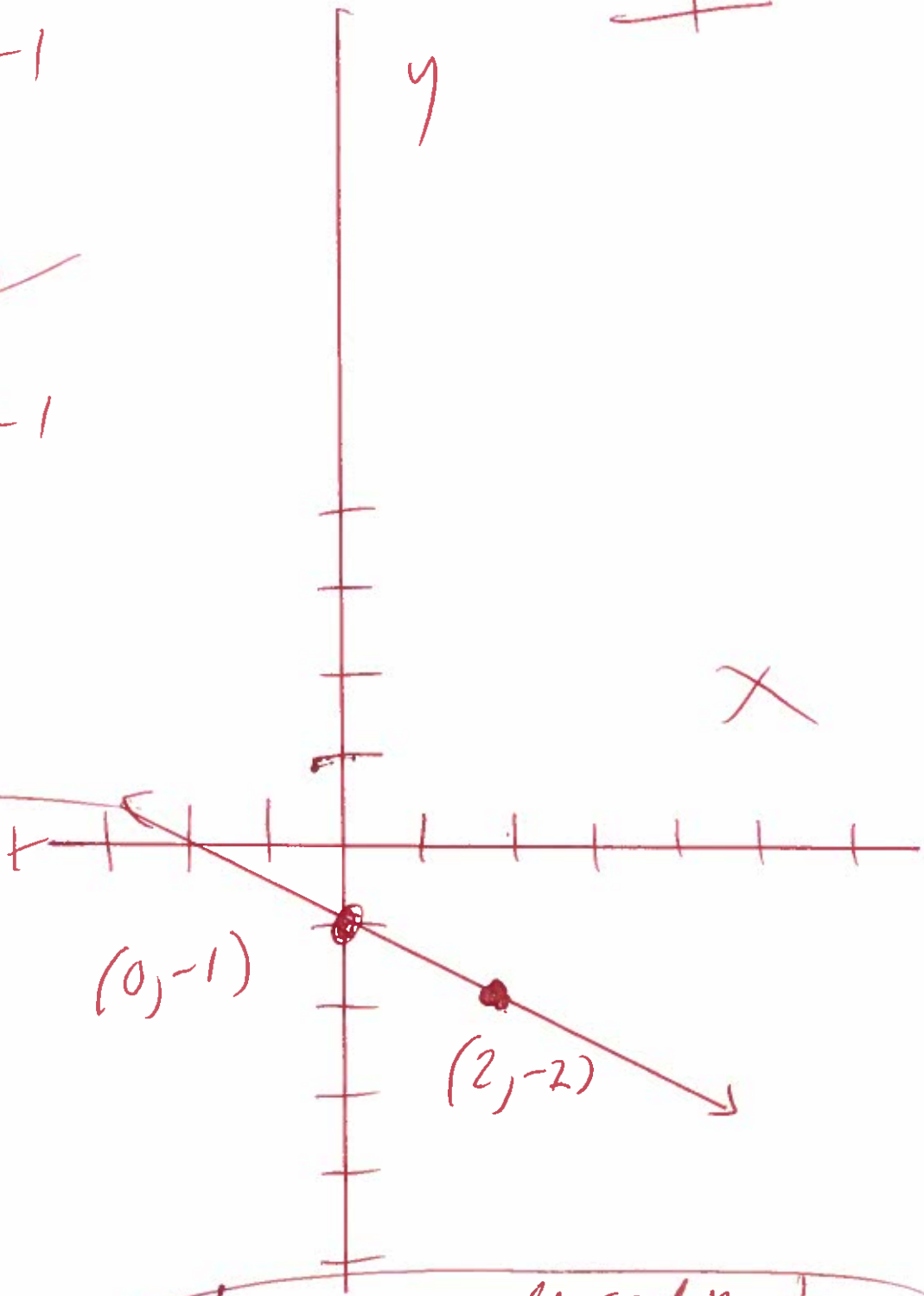
$y = 0 - 1$

$y = -1$

$y = -\frac{1}{2}(2) - 1$

$y = -1 - 1$

$y = -2$



domain all real numbers

range all real numbers

(21) graph

$5x - 2y = 10$

$\cancel{5x} - 2y - \cancel{5x} = 10 - 5x$

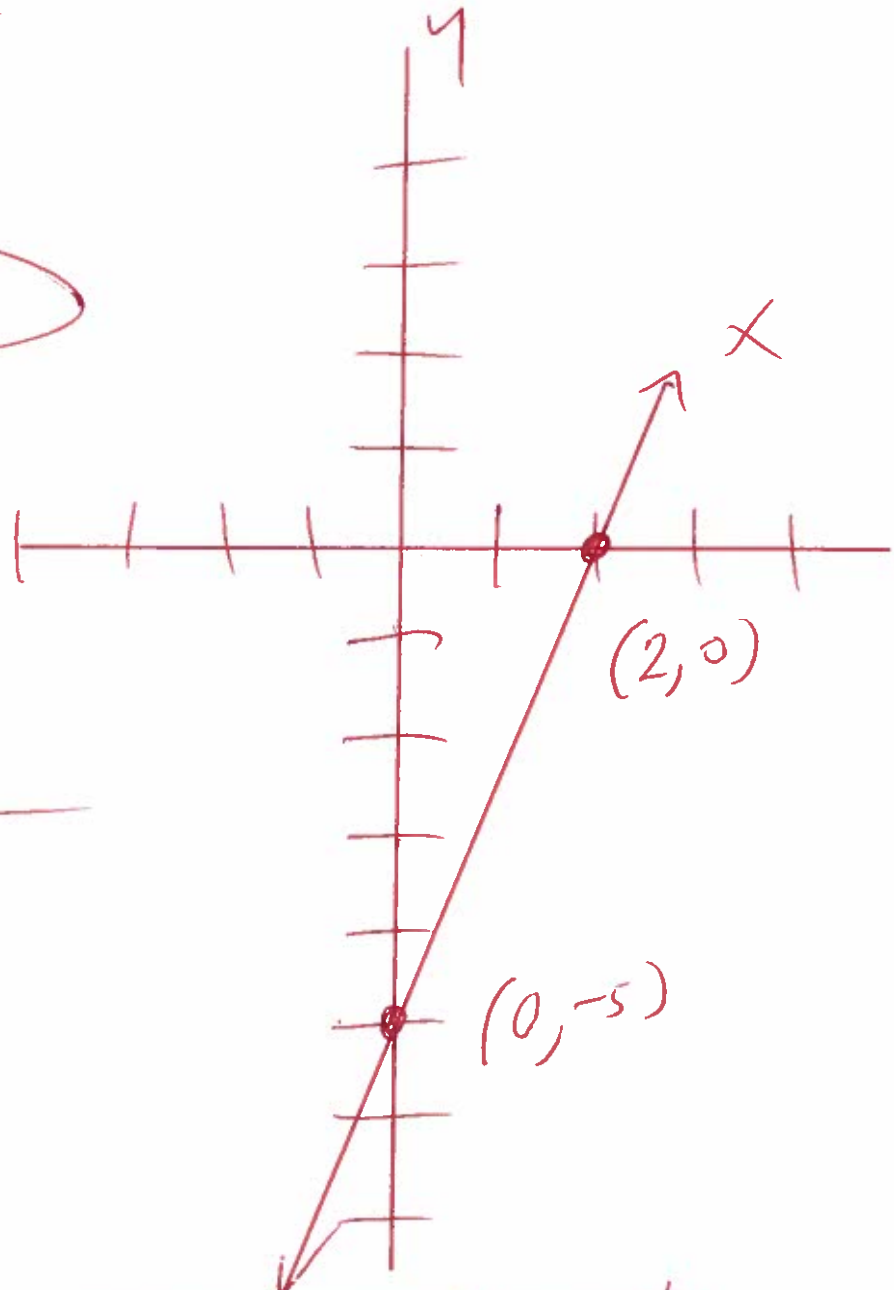
$-2y = 10 - 5x$

$\frac{-2y}{-2} = \frac{10}{-2} - \frac{5x}{-2}$

$y = -5 + \frac{5}{2}x$

$y = \frac{5}{2}x - 5$

x	y
0	-5
2	0



$y = \frac{5}{2}(0) - 5$

$y = 0 - 5$

$y = -5$

$y = \frac{5}{2}(2) - 5$

$y = 5 - 5$

$y = 0$

domain all real numbers

range all real numbers

(22) graph

$y = 2x$

$y = 2x + 4$

Parallel Lines never intersect

No solution

$y = 2x$

$y = 2(0)$

$y = 0$

$y = 2(1)$

$y = 2$

x	y
0	0
1	2

$y = 2x + 4$

$y = 2(0) + 4$

$y = 0 + 4$

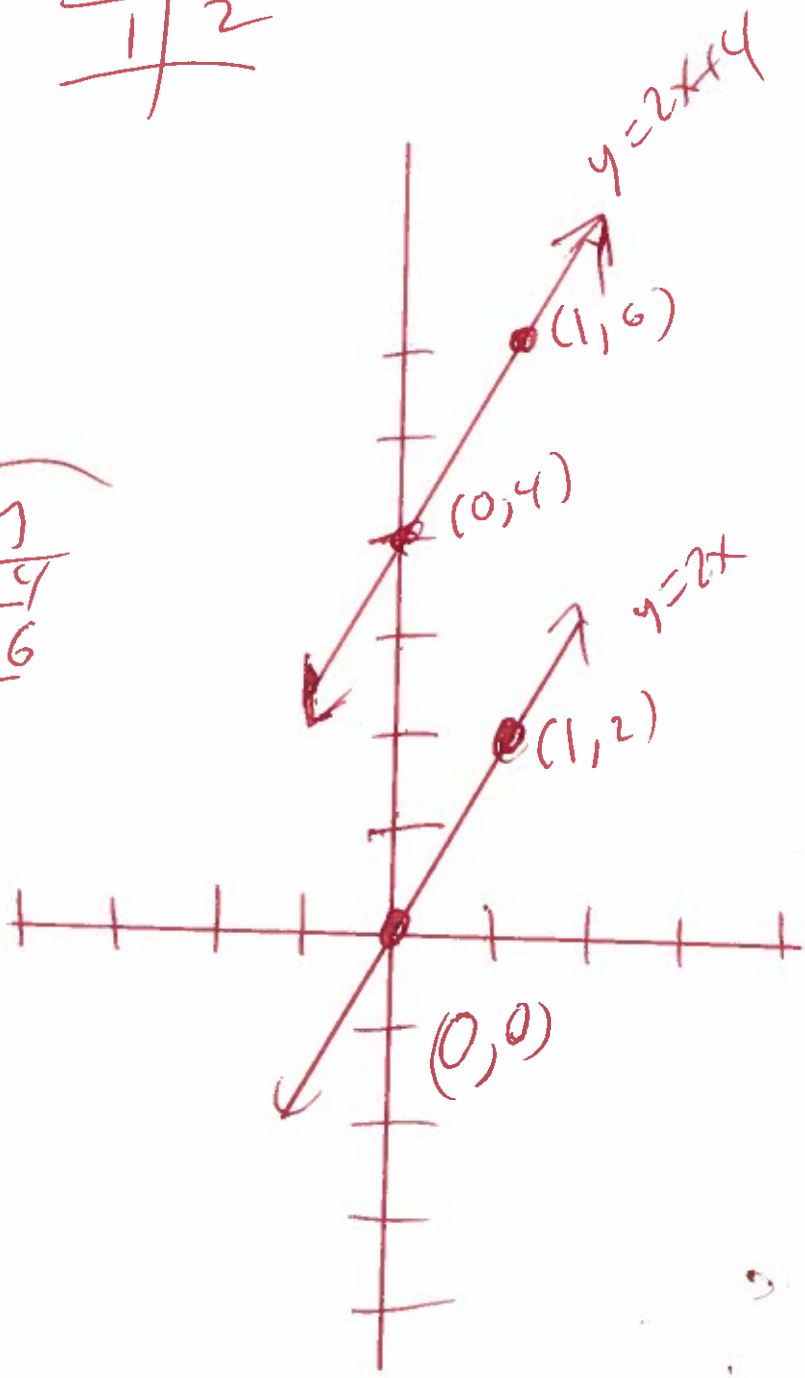
$y = 4$

$y = 2(1) + 4$

$y = 2 + 4$

$y = 6$

x	y
0	4
1	6



(23) Graph

$y = 3x$

and

$y = 3x + 4$

Parallel Lines never intersect

$y = 3x$

$y = 3(0)$

$y = 0$

$y = 3(1)$

$y = 3$

x	y
0	0
1	3

$y = 3x + 4$

$y = 3(0) + 4$

$y = 0 + 4$

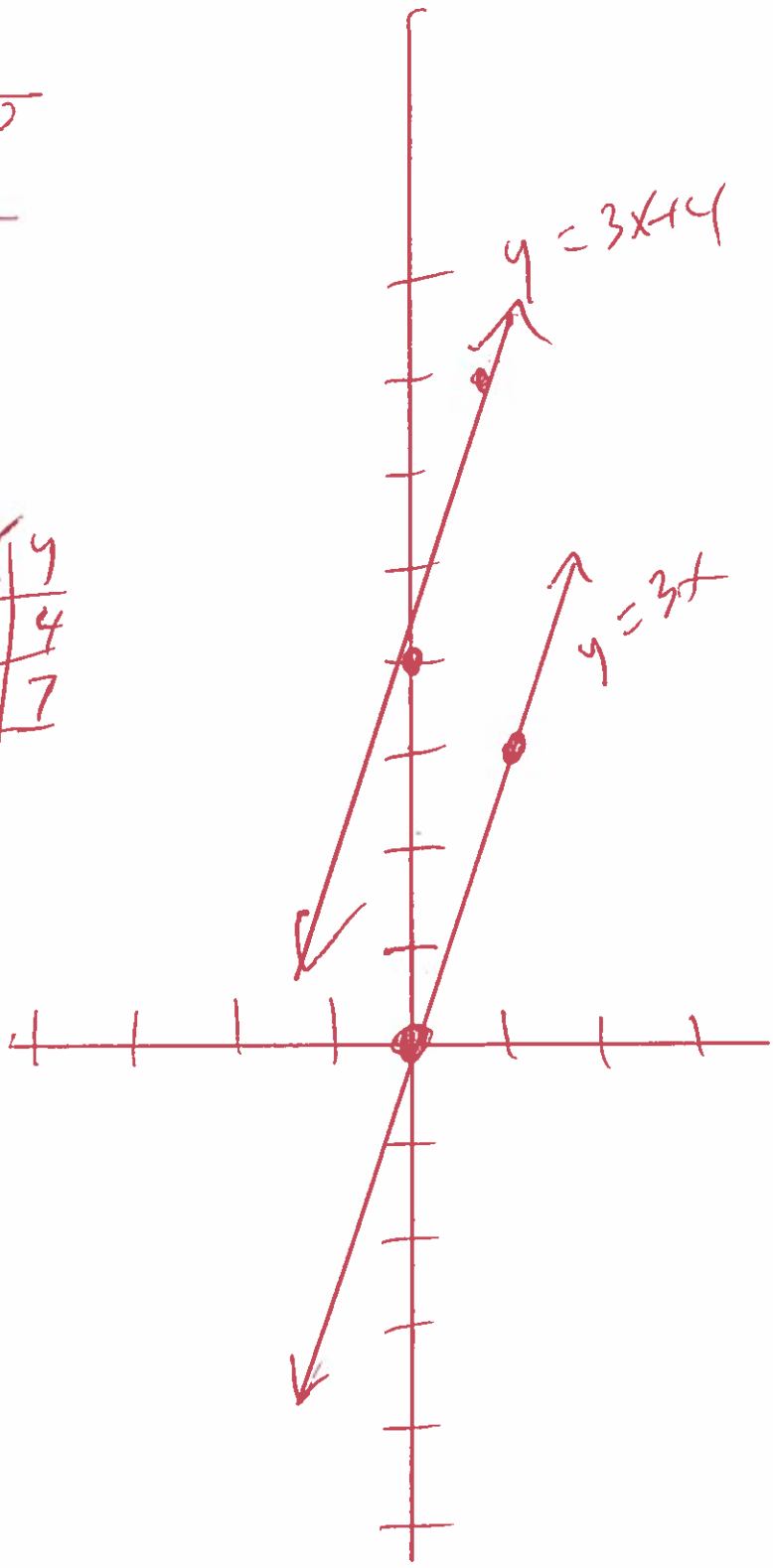
$y = 4$

$y = 3(1) + 4$

$y = 3 + 4$

$y = 7$

x	y
0	4
1	7



(24) Graph

$y = 6x$

and

$y = 6x - 3$

Parallel Lines never intersect

$y = 6x$

x	y
0	0
1	6

$y = 6(0)$

$y = 0$

$y = 6(1)$

$y = 6$

$y = 6x - 3$

$y = 6(0) - 3$

$y = 0 - 3$

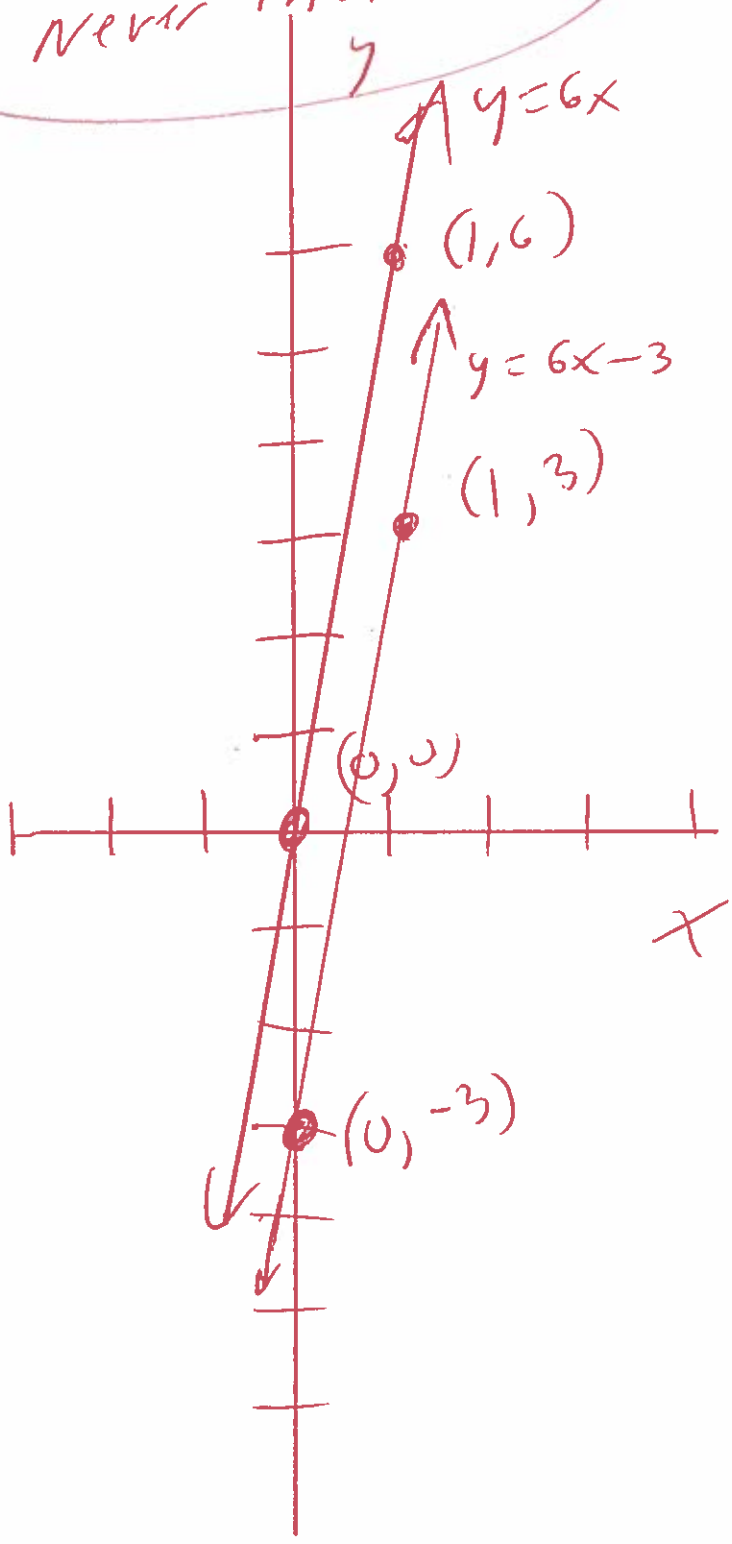
$y = -3$

x	y
0	-3
1	3

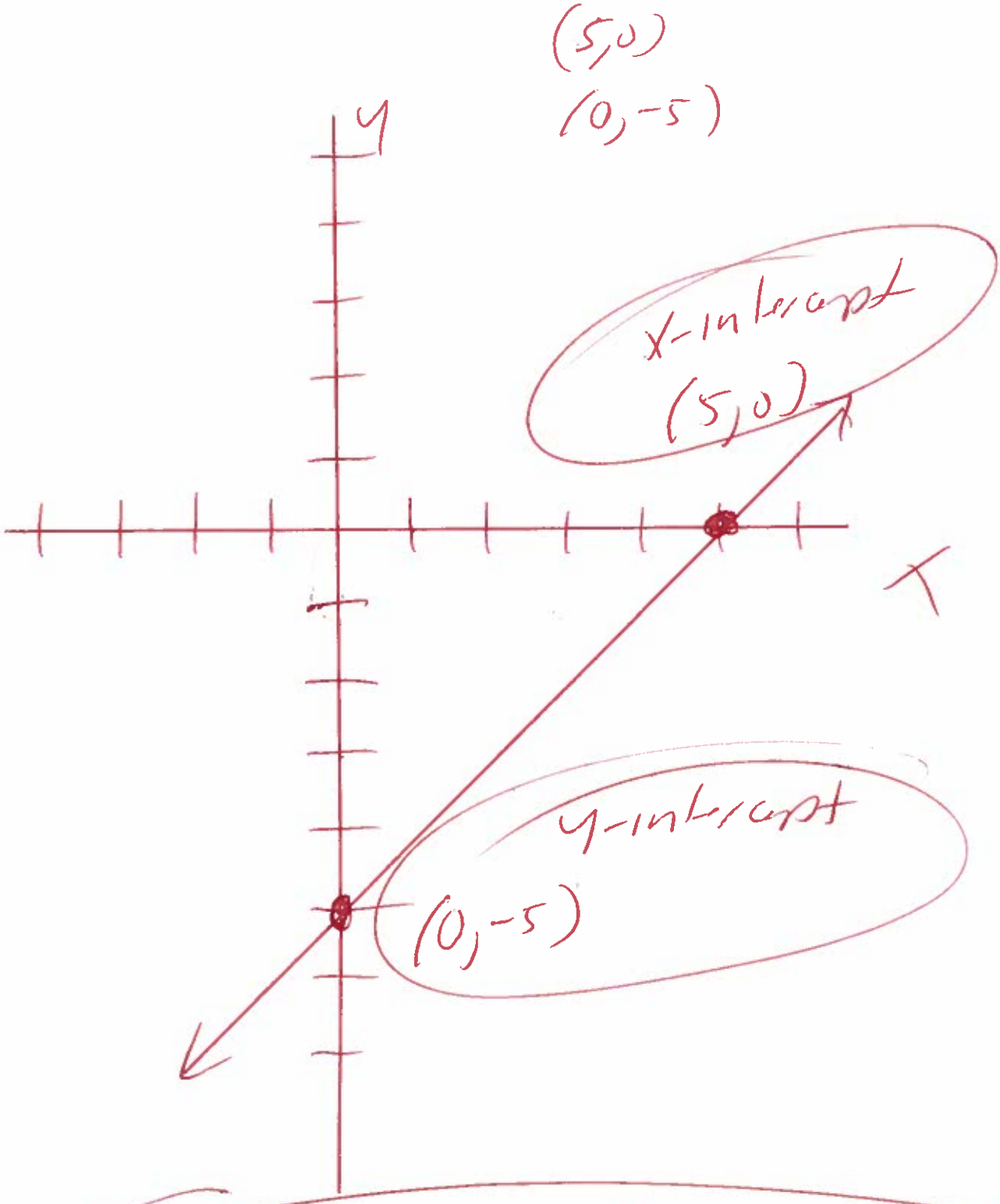
$y = 6(1) - 3$

$y = 6 - 3$

$y = 3$



(25.) Identify the intercepts



domain all real numbers

range all real numbers

(26.) graph the linear equation by finding and plotting it intercepts

$x - y = -3$

let $y = 0$ to find x-intercept

$x - |0| = -3$

$x - 0 = -3$

$x = -3$

x-intercept

$(-3, 0)$

domain
all real numbers

range
all real numbers

$x - y = -3$

let $x = 0$ to find y-intercept

$(0) - y = -3$

$0 - y = -3$

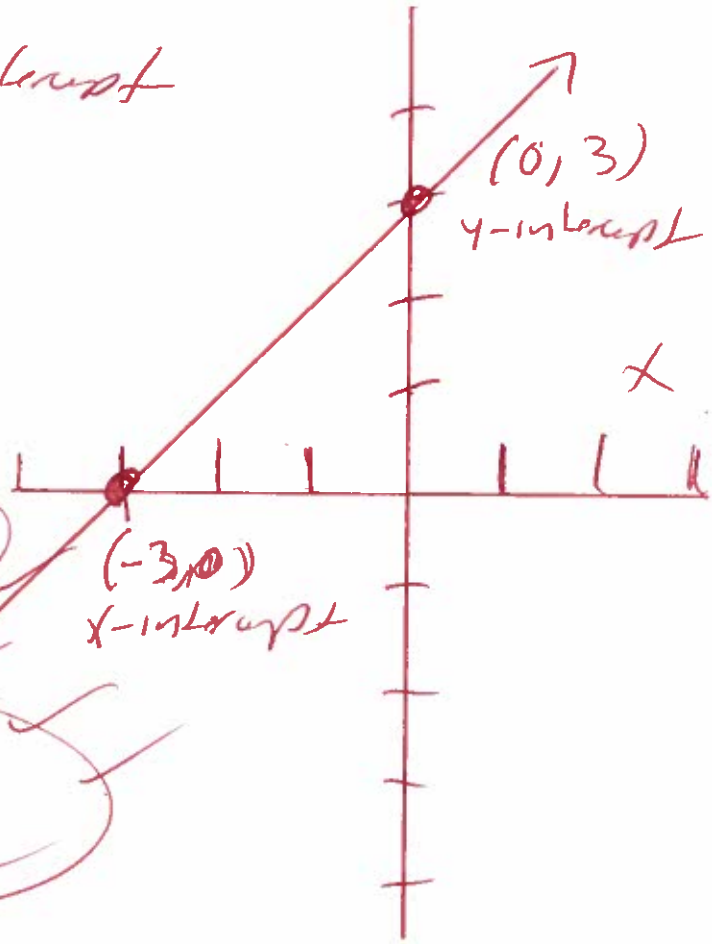
$-y = -3$

$\frac{-y}{-1} = \frac{-3}{-1}$

$y = 3$

y-intercept

$(0, 3)$



(29.) graph the linear equation by finding and plotting its intercepts

$$-x+3y=3$$

let $y=0$ to find x-intercept

$$-x+3(0)=3$$

$$-x+0=3$$

$$-x=3$$

$$\frac{-x}{-1}=\frac{3}{-1}$$

$x=-3$

x-intercept

$(-3,0)$

domain
all real numbers

range
all real numbers

$$-x+3y=3$$

let $x=0$ to find y-intercept

$$-(0)+3y=3$$

$$0+3y=3$$

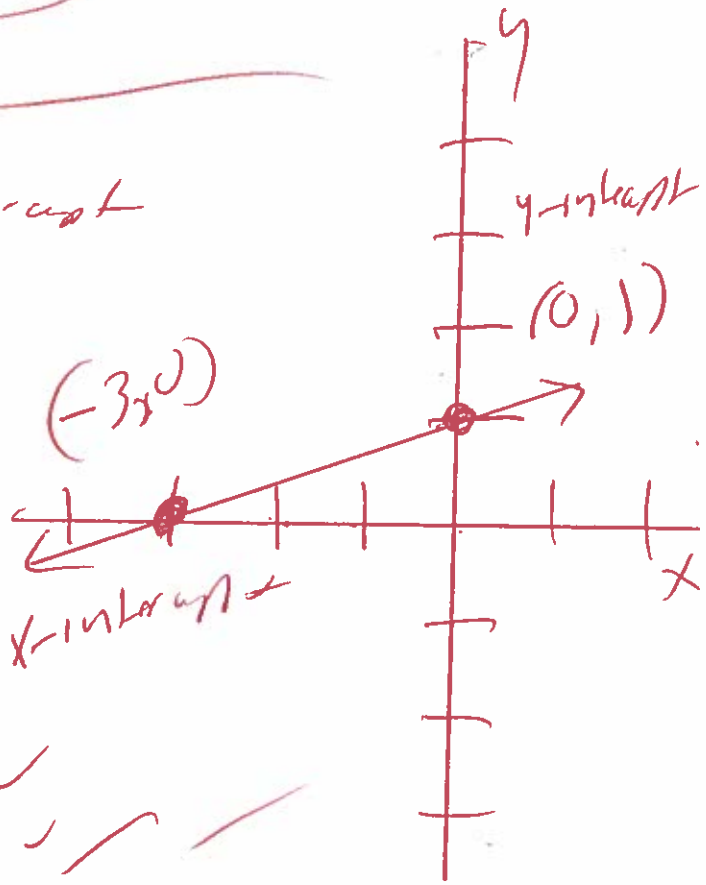
$$3y=3$$

$$\frac{3y}{3}=\frac{3}{3}$$

$y=1$

y-intercept

$(0,1)$



(28.) Plot the intercepts to graph the equation

$7x - 2y = 14$

domain: all real numbers

range: all real numbers

let $y = 0$ to find x-intercept

$7x - 2(0) = 14$

$7x - 0 = 14$

$7x = 14$

$\frac{7x}{7} = \frac{14}{7}$

$x = 2$

x-intercept

(2, 0)

$7x - 2y = 14$

let $x = 0$ to find y-intercept

$7(0) - 2y = 14$

$0 - 2y = 14$

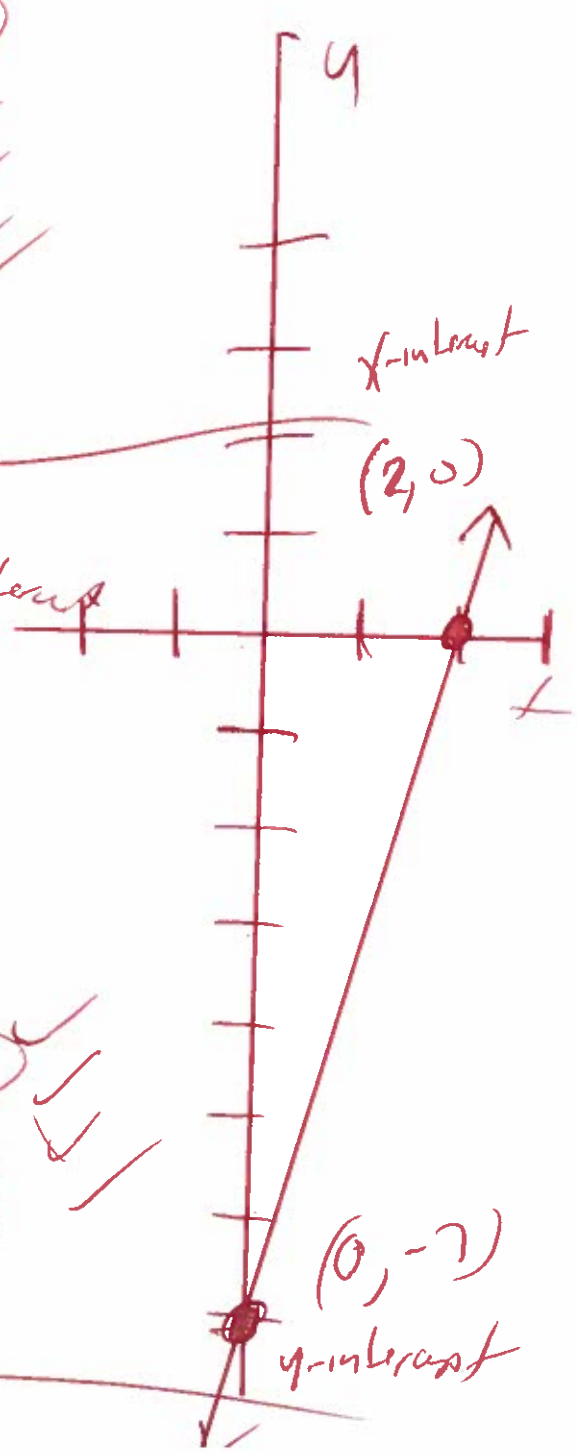
$-2y = 14$

$\frac{-2y}{-2} = \frac{14}{-2}$

$y = -7$

y-intercept

(0, -7)



(29) graph using the x and y-intercepts

$y = 4x + 4$

let $y = 0$ to find x-intercept

$0 = 4x + 4$

$0 - 4 = 4x + 4 - 4$

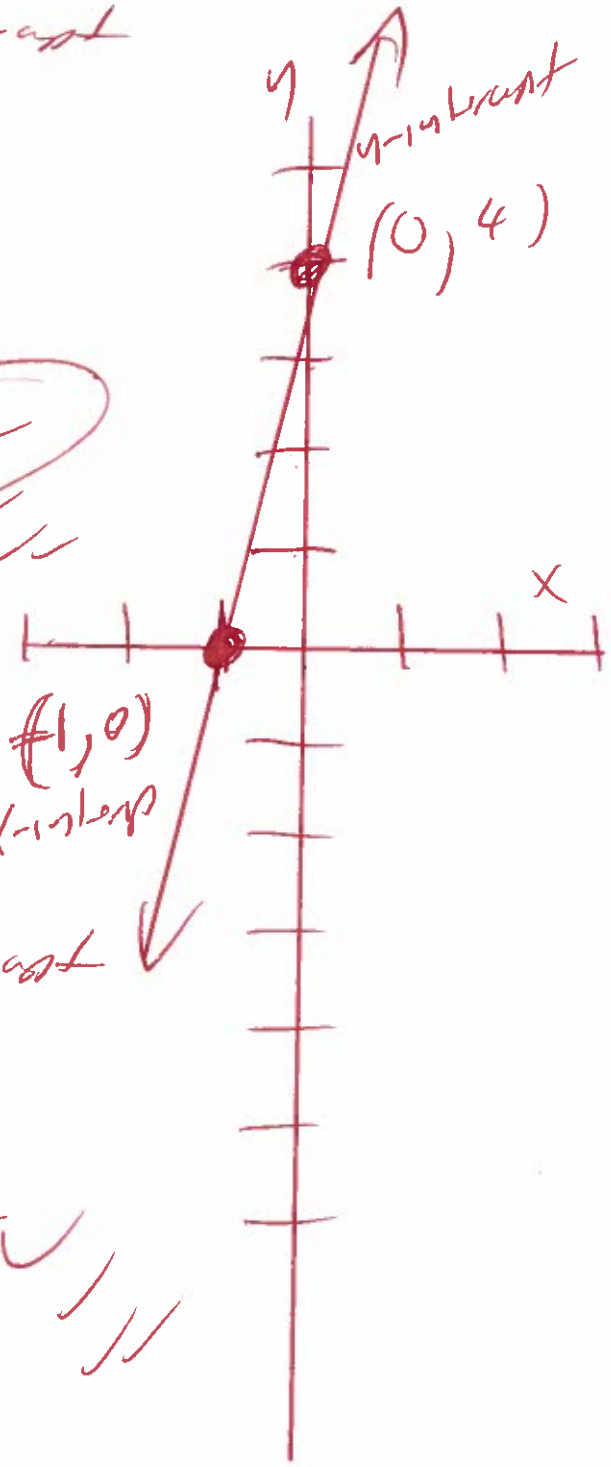
$-4 = 4x$

$\frac{-4}{4} = \frac{4x}{4}$

$-1 = x$

x-intercept

$(-1, 0)$



$y = 4x + 4$

let $x = 0$ to find y-intercept

$y = 4(0) + 4$

$y = 0 + 4$

$y = 4$

y-intercept

$(0, 4)$

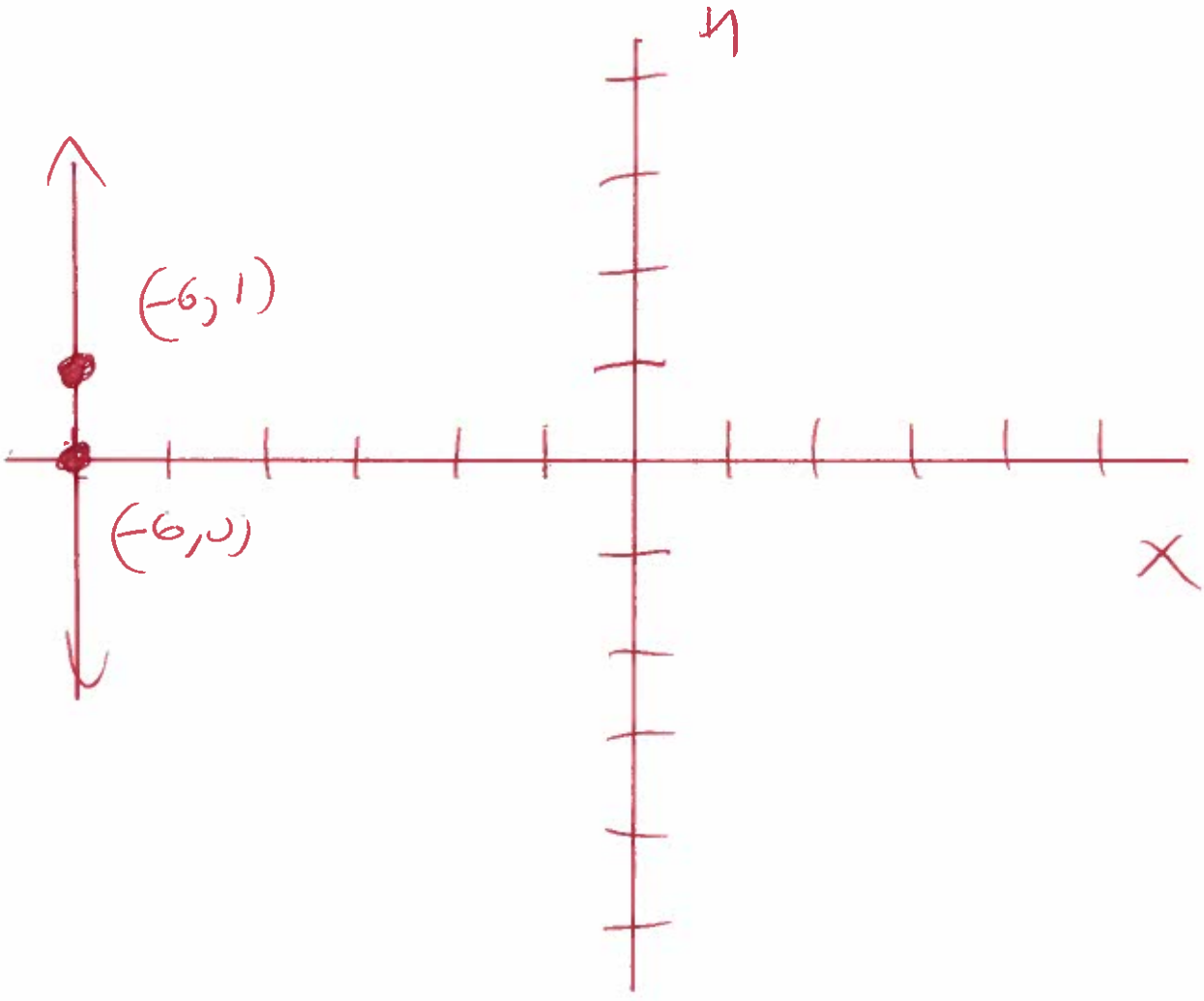
domain all real numbers

range all real numbers

30. graph

$x = -6$

x	y
-6	0
-6	1



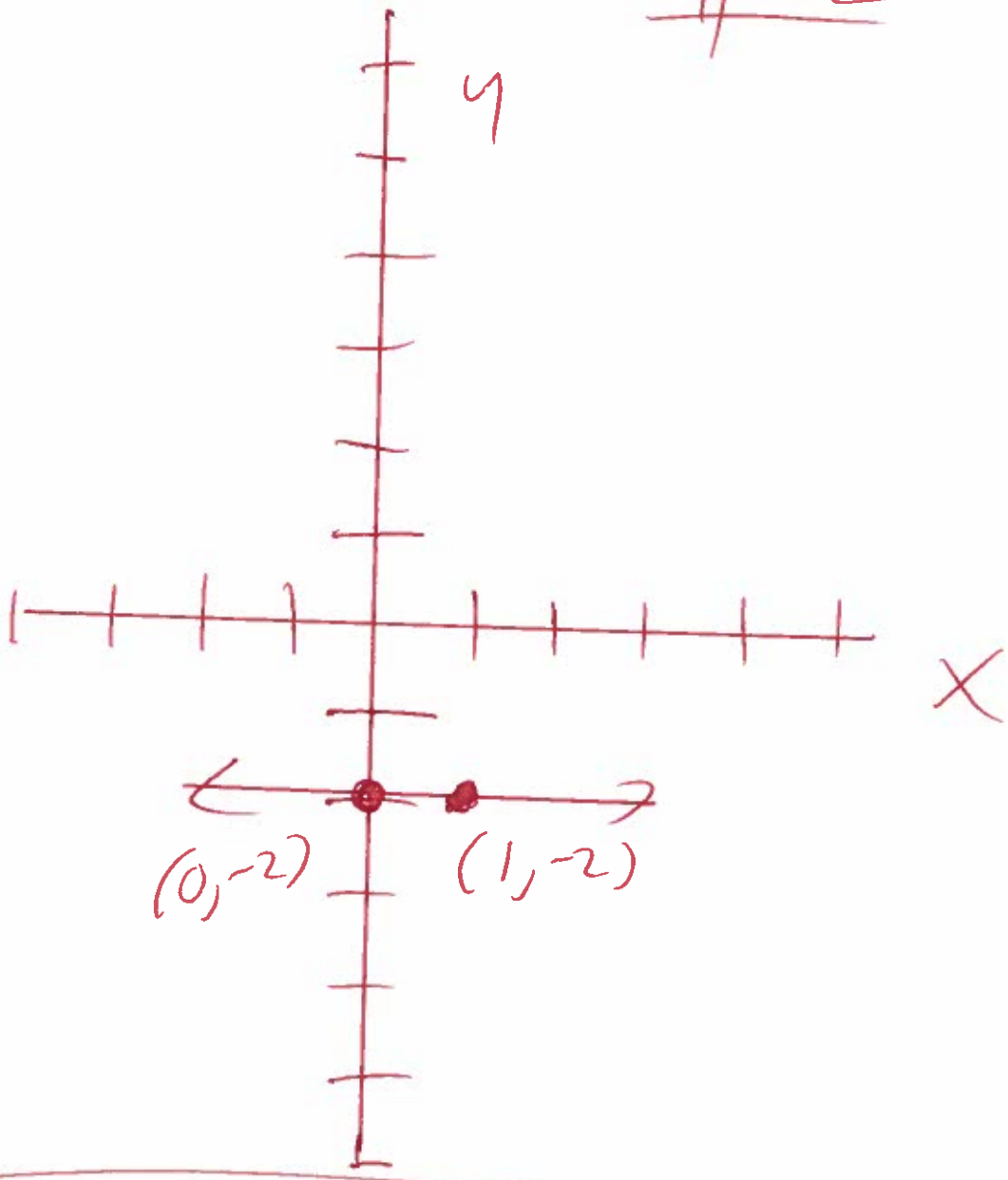
domain $\{-6\}$

range all real numbers

(3) graph

$y = -2$

x	y
0	-2
1	-2



domain all real numbers

range $\{-2\}$

(32) graph

$x + 3y = -9$

$x + 3y - x = -9 - x$

$3y = -9 - x$

$\frac{3y}{3} = \frac{-9}{3} - \frac{x}{3}$

$y = -3 - \frac{1}{3}x$

$y = -\frac{1}{3}x - 3$

x	y
0	-3
3	-4

$y = -\frac{1}{3}(0) - 3$

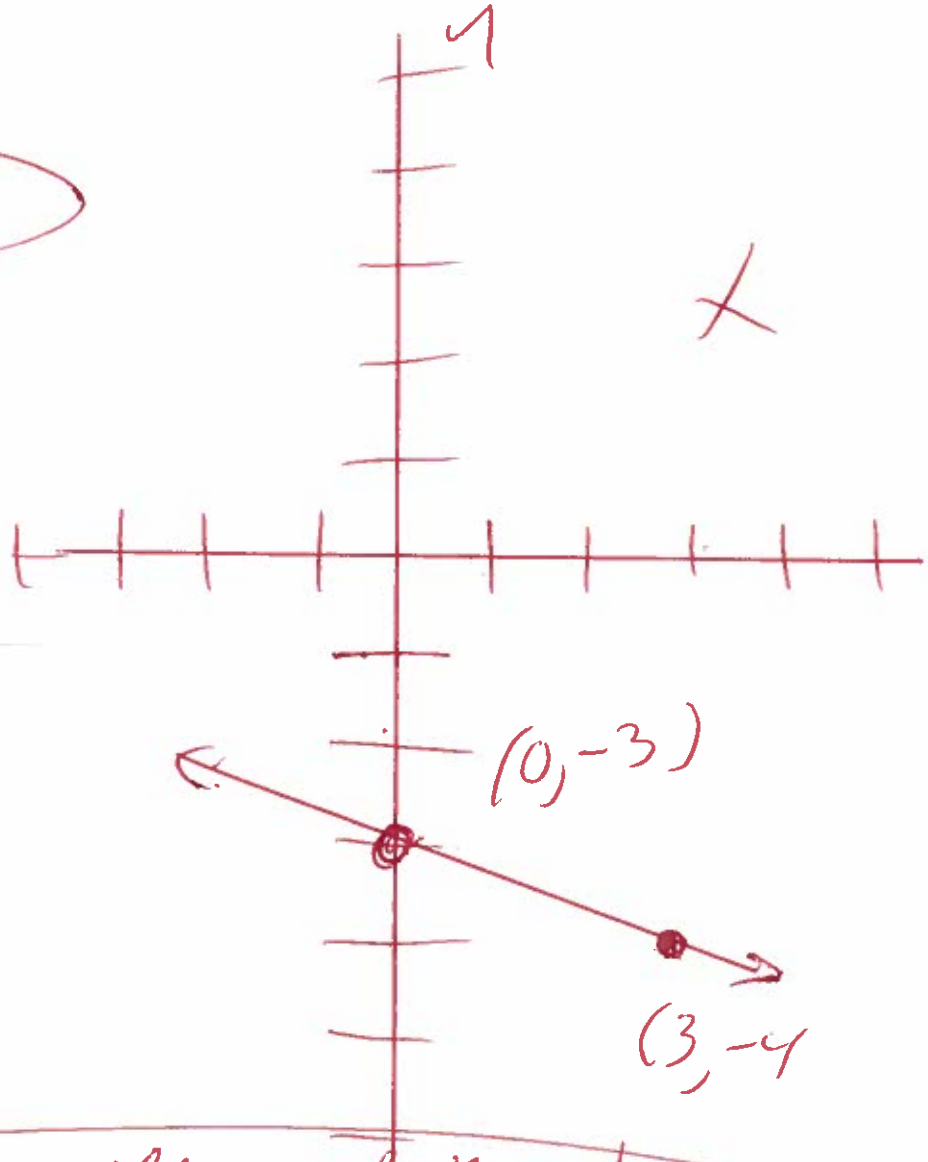
$y = 0 - 3$

$y = -3$

$y = -\frac{1}{3}(3) - 3$

$y = -1 - 3$

$y = -4$



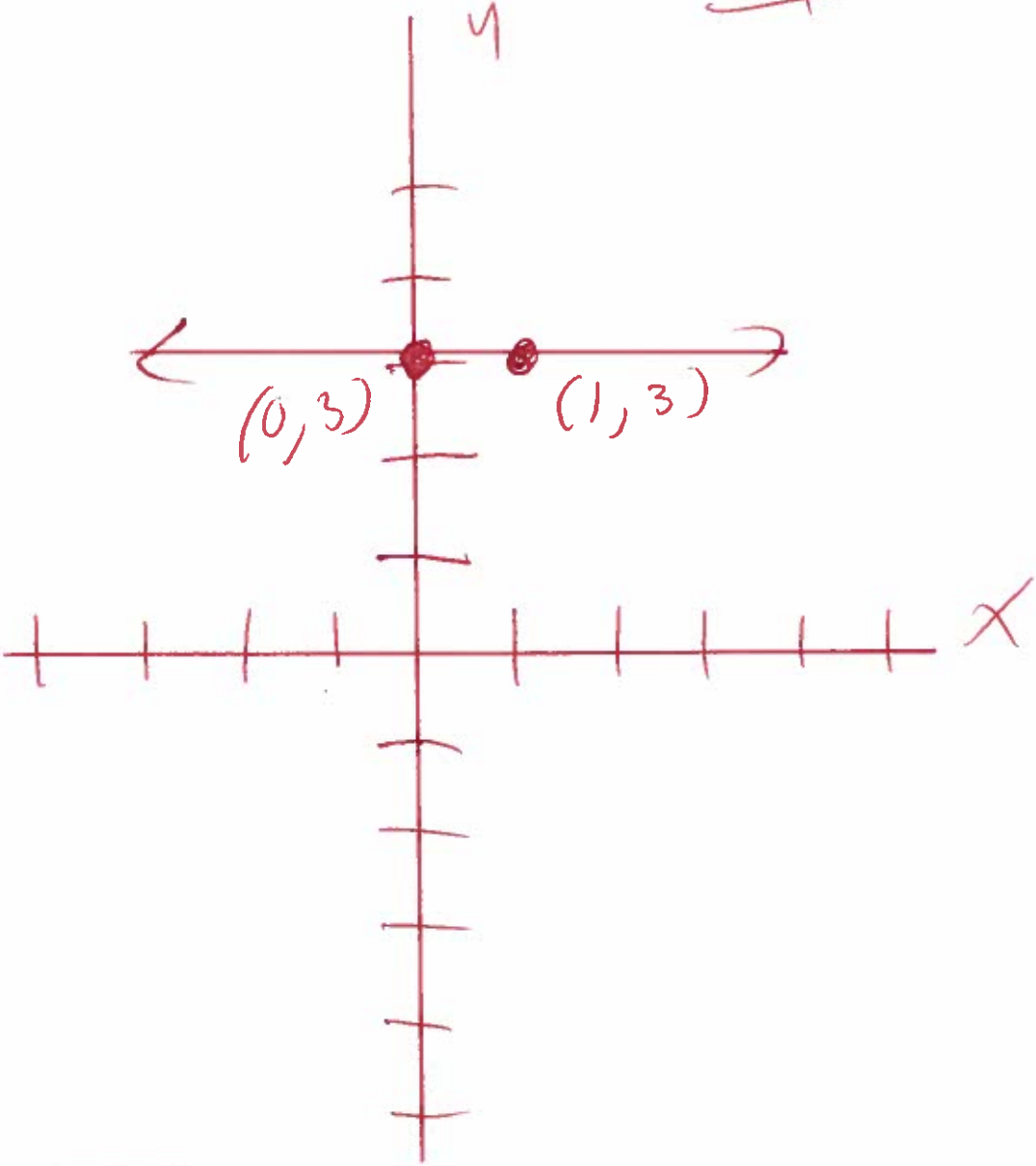
domain all real numbers

range all real numbers

(33) graph

$y = 3$

x	y
0	3
1	3



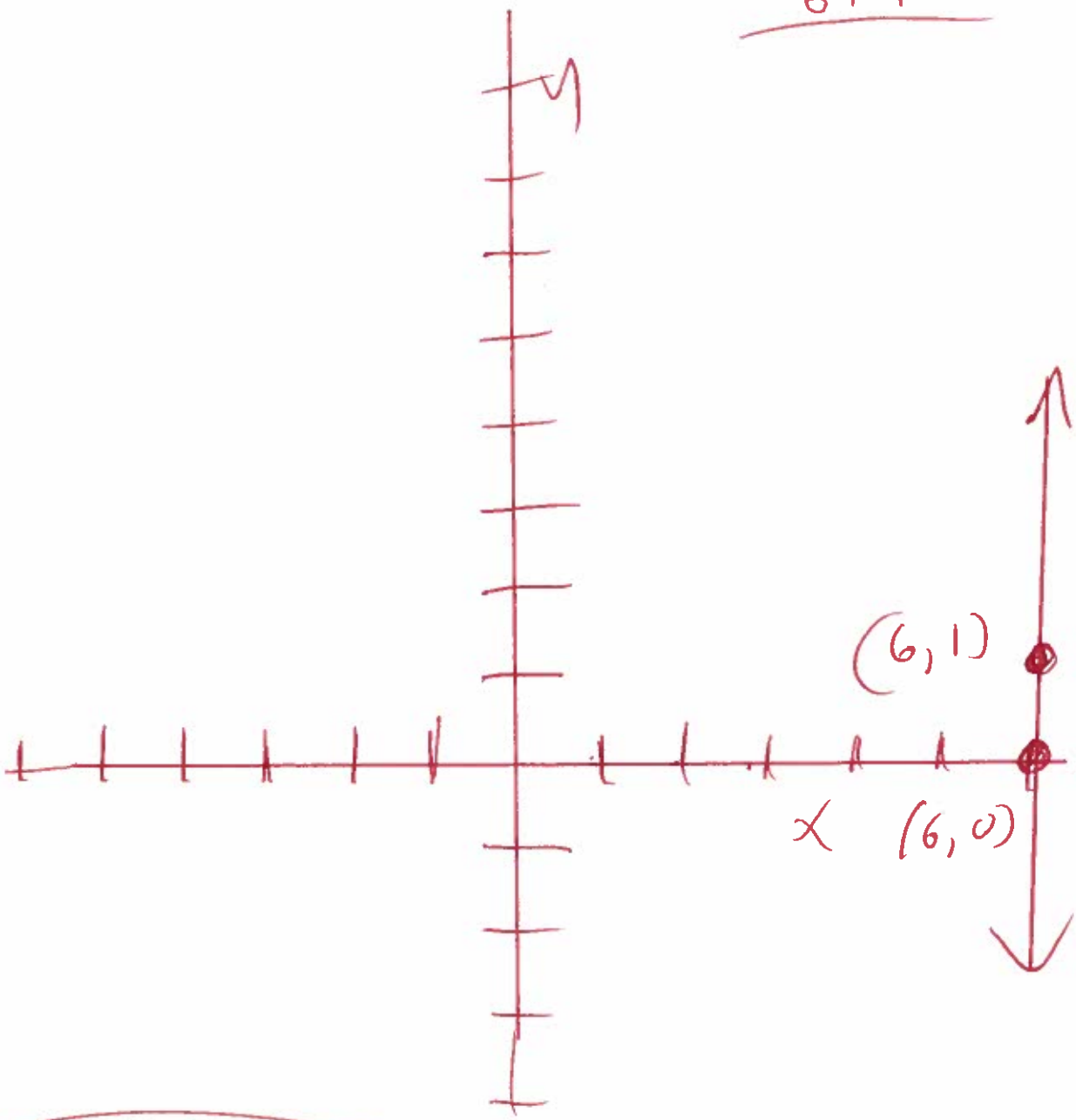
Domain all real numbers

Range {3}

(34) graph

$x = 6$

x	y
6	0
6	1



domain $\{6\}$

range all real numbers

(35.) find the slope of the line that goes through the given points

$(-2, 1)$ and $(-3, 5)$

x_1, y_1 $\quad$ x_2, y_2

$$m = \frac{y_1 - y_2}{x_1 - x_2}$$ formula

$$m = \frac{(1) - (5)}{(-2) - (-3)}$$

$$m = \frac{1 - 5}{-2 + 3}$$

$$m = \frac{-4}{1}$$

$$m = -4$$

(36.) find the slope of the line that goes through the given points

$(-3, 5)$ and $(-3, 3)$
$x_1\ y_1$ $\quad$ $x_2\ y_2$

$$m = \frac{y_1 - y_2}{x_1 - x_2}$$ formula

$$m = \frac{(5) - (3)}{(-3) - (-3)}$$

$$m = \frac{5 - 3}{-3 + 3}$$

$$m = \frac{2}{0}$$

Undefined Slope ✓

(37) find the slope of the line that goes through the given points.

$(3, 7)$ and $(-8, -10)$

x_1, y_1 $\quad$ x_2, y_2

$$m = \frac{y_1 - y_2}{x_1 - x_2}$$

$$m = \frac{(7) - (-10)}{(3) - (-8)}$$

$$m = \frac{7 + 10}{3 + 8}$$

$$m = \frac{17}{11}$$

(38) find the slope of the line that goes through the given points.

$(2, 7)$ and $(-5, 7)$

$x_1 \quad y_1 \qquad x_2 \quad y_2$

$$m = \frac{y_1 - y_2}{x_1 - x_2}$$ formula

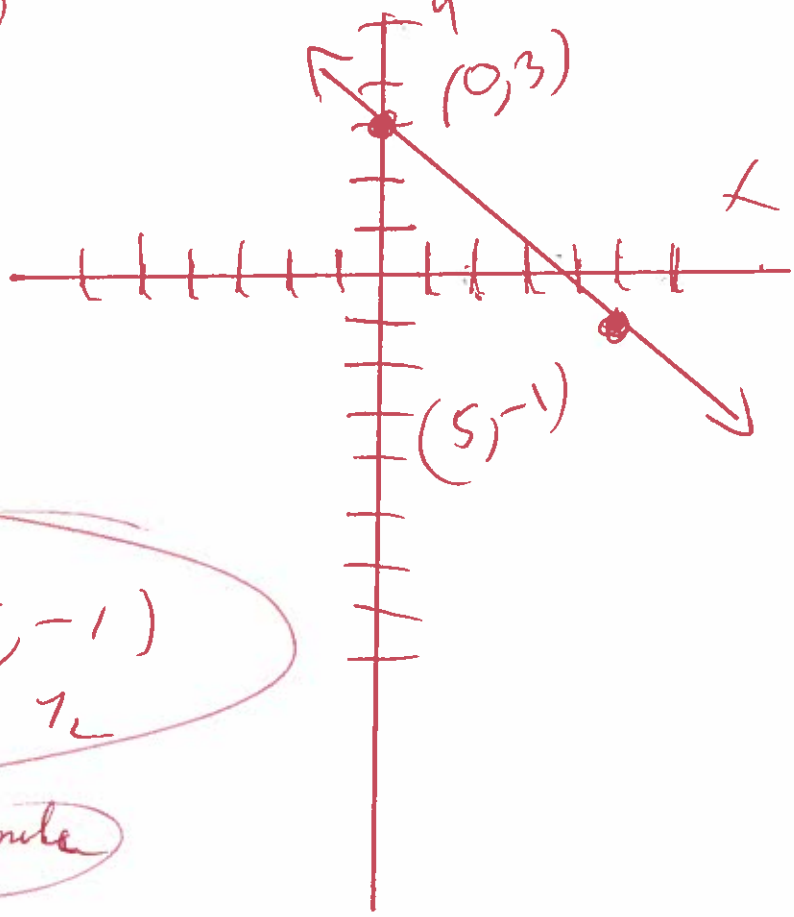
$$m = \frac{(7) - (7)}{(2) - (-5)}$$

$$m = \frac{7 - 7}{2 + 5}$$

$$m = \frac{0}{7}$$

$$m = 0$$

(39) Find the slope of the line if it exists.



$(0,3)$ and $(5,-1)$

$x_1\ y_1 \qquad x_2\ y_2$

$m = \dfrac{y_1 - y_2}{x_1 - x_2}$ Slope formula

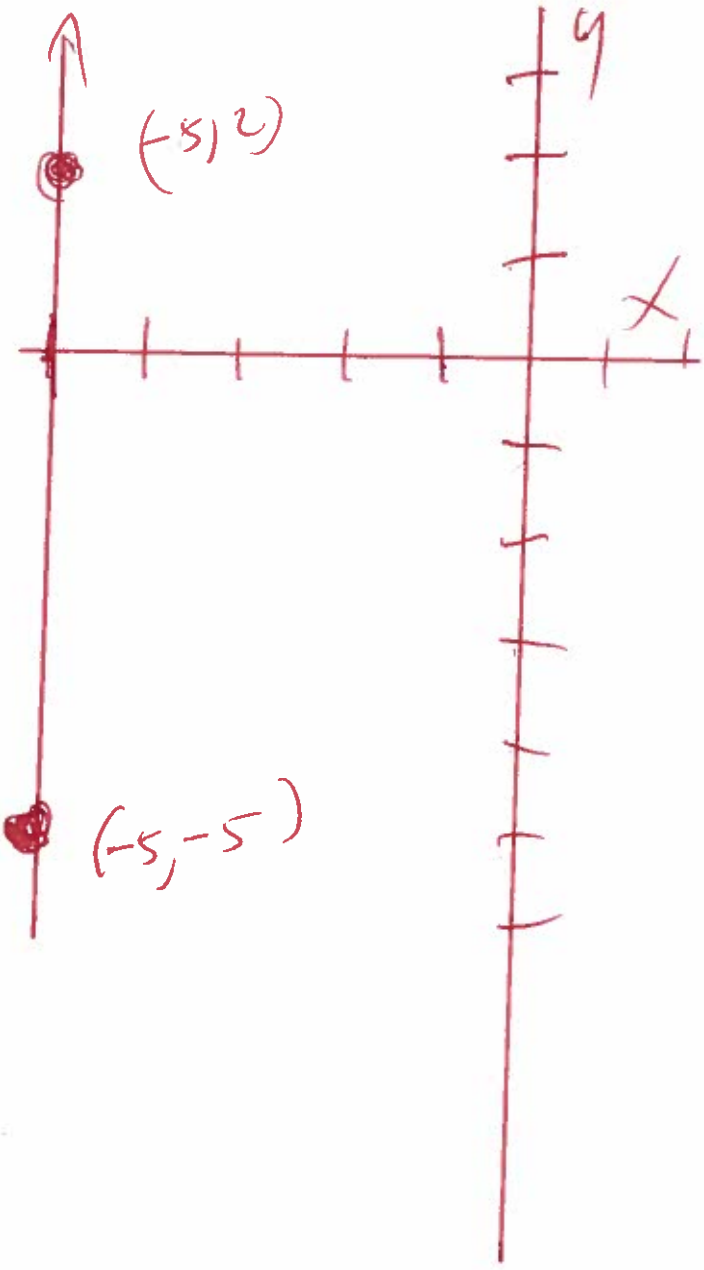
$m = \dfrac{(3)-(-1)}{(0)-(5)}$

$m = \dfrac{3+1}{0-5}$

$m = \dfrac{4}{-5}$

$m = -5$

(40.) Find the slope of the line if it exists



$(-5, 2)$ and $(-5, -5)$
$x_1\ y_1 \qquad x_2\ y_2$

$$m = \frac{y_1 - y_2}{x_1 - x_2}$$

$$m = \frac{(2) - (-5)}{(-5) - (-5)}$$

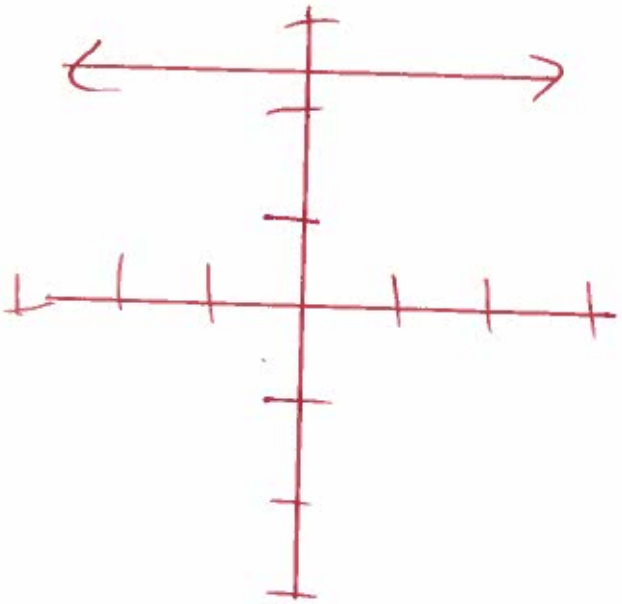
$$m = \frac{2 + 5}{-5 + 5}$$

$$m = \frac{7}{0}$$

Undefined slope

(41.) for the graph on the right determine if the slope is positive, negative, zero, or undefined

Slope = 0



$y = mx + b$

$y = 0x + b$

↑ slope

---

(42) Solve for y

$y - (-7) = 2(x - 6)$

$y + 7 = 2x - 12$

$y + 7 - 7 = 2x - 12 - 7$

$y = 2x - 19$

(43) graph

$y = -7x + 4$

$y = -7(0) + 4$

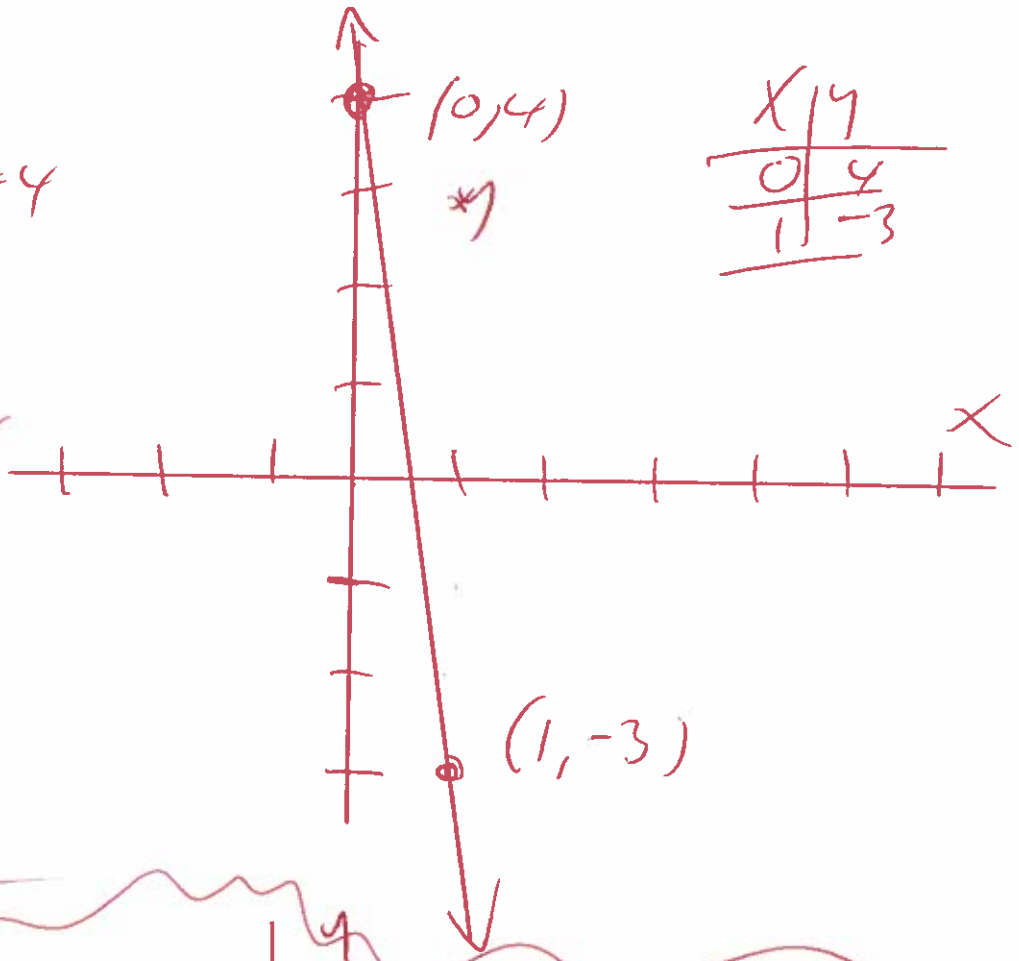
$y = 0 + 4$

$y = 4$

$y = -7(1) + 4$

$y = -7 + 4$

$y = -3$



x	y
0	4
1	-3

(44) graph

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

$y = -\frac{3}{4}(0) - 5$

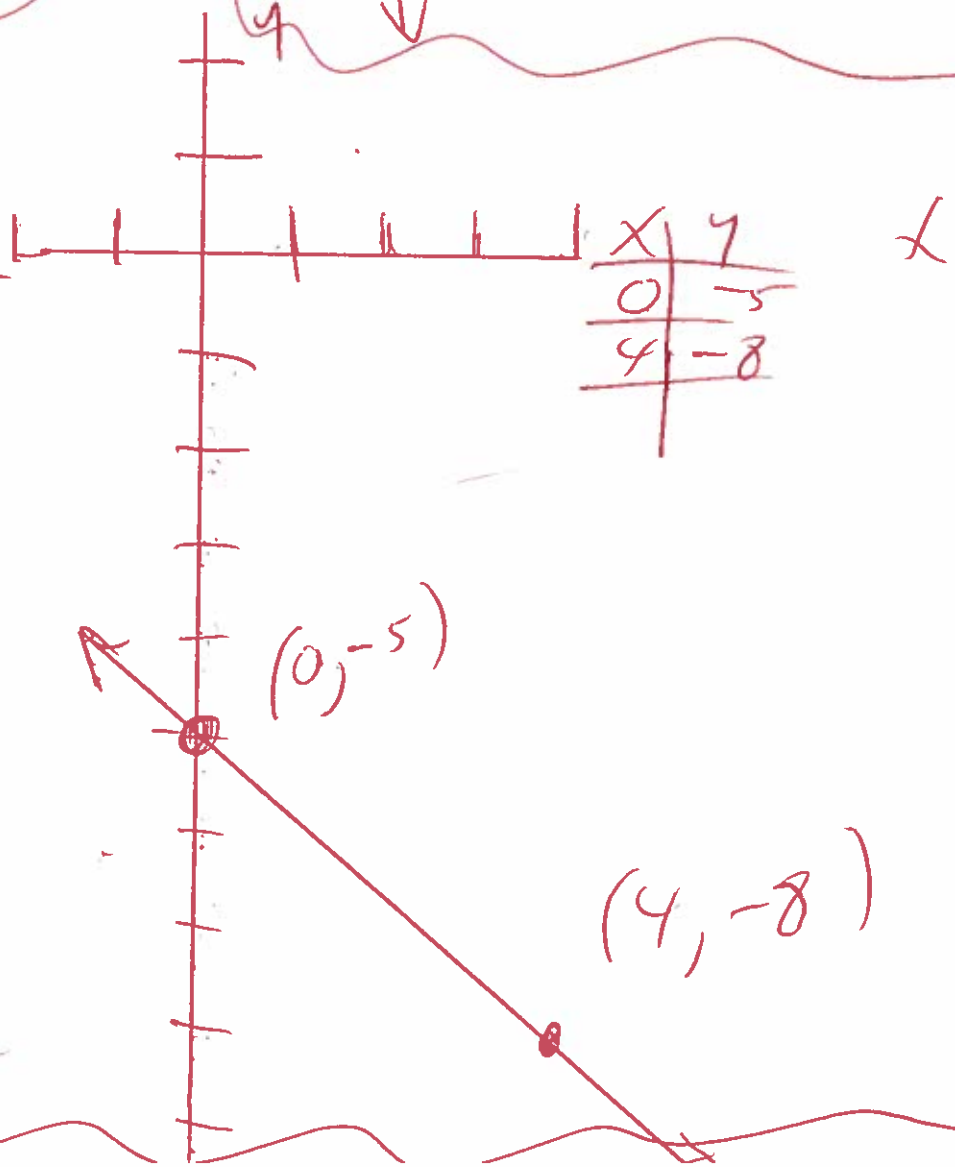
$y = 0 - 5$

$y = -5$

$y = -\frac{3}{4}(4) - 5$

$y = -3 - 5$

$y = -8$



x	y
0	-5
4	-8

(45) Write an equation of the line with the given slope, m at y-intercept (0, b)

$m = 9$ $b = 8$

$y = mx + b$ slope intercept formula

$y = 9x + 8$

---

(46) Write an equation of the line with the given slope, m at y-intercept (0, b)

$m = -8$ $b = -\frac{1}{5}$

$y = mx + b$ slope intercept formula

$y = -8x - \frac{1}{5}$

(47.) Find an equation of the line with the given slope that passes through the given point. Write the equation in the form

$Ax + By = C$

$m = -6 \qquad (-5, -7)$

$x_1 \quad y_1$

$y - y_1 = m(x - x_1)$

$y - (-7) = -6(x - (-5))$

$y + 7 = -6(x + 5)$

$y + 7 = -6x - 30$

$y + 7 - 7 = -6x - 30 - 7$

$y = -6x - 37$

$y + 6x = -6x - 37 + 6x$

$y + 6x = -37$

$6x + y = -37$

(48) Find an equation of the line with the given slope that passes through the given point. Write the equation in the form $Ax+By=C$

$m=\frac{3}{2}$ $(7,-4)$ x_1 y_1

$y-y_1=m(x-x_1)$

$y-(-4)=\frac{3}{2}(x-(7))$

$y+4=\frac{3}{2}(x-7)$

$y+4=\frac{3}{2}x-\frac{21}{2}$

$(y+4)(2)=\left(\frac{3}{2}x-\frac{21}{2}\right)^2$

$2y+8=\frac{6}{2}x-\frac{42}{2}$

$2y+8=3x-21$

$2y+8-8=3x-21-8$

$2y=3x-29$

$2y-3x=3x-29-3x$

$2y-3x=-29$

$-1(2y-3x)=-1(-29)$

$-2y+3x=29$

Rewrite

$3x-2y=29$

(49.) Find an equation of the line passing through the pair of points. Write the equation in the form $Ax + By = C$.

$(4, 6)$ and $(3, -9)$

$x_1\ y_1 \qquad x_2\ y_2$

$$y - y_1 = \frac{y_1 - y_2}{x_1 - x_2}(x - x_1)$$

$$y - (6) = \frac{(6) - (-9)}{(4) - (3)}(x - (4))$$

$$y - 6 = \frac{6 + 9}{4 - 3}(x - 4)$$

$$y - 6 = \frac{15}{1}(x - 4)$$

$$y - 6 = 15(x - 4)$$

$$y - 6 = 15x - 60$$

$$y - 6 + 6 = 15x - 60 + 6$$

$$y = 15x - 54$$

$$y - 15x = 15x - 54 - 15x$$

$$y - 15x = -54$$

$$-15x + y = -54$$

Rewrite

(50.) Find the slope-intercept form of the line whose slope is 6 and that passes through the point $(-2, 4)$.

$x_1 \quad y_1$

$m = 6 =$ slope point $(-2, 4)$

$x_1 \quad y_1$

$$y - y_1 = m(x - x_1)$$

$$y - (4) = 6(x - (-2))$$

$$y - 4 = 6(x + 2)$$

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

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

$$y = 6x + 16$$

(51) Find the slope-intercept equation of the line that has the given characteristics

slope $= -7$ at y-intercept $(0, 8)$

$m = -7$ = slope y-intercept $(0, 8)$

$x_1 \quad y_1$

$y - y_1 = m(x - x_1)$

$y - (8) = -7(x - (0))$

$y - 8 = -7(x - 0)$

$y - 8 = -7(x)$

$y - 8 = -7x$

$y - 8 + 8 = -7x + 8$

$y = -7x + 8$

(52.) Find an equation of the line described below. Write the equation in slope-intercept form (solve for y) when possible.

slope $= -\frac{6}{7} = m$ $\qquad$ $(-6, -1)$ Point

$x_1 \quad y_1$

$$y - y_1 = m(x - x_1)$$

$$y - (-1) = -\frac{6}{7}(x - (-6))$$

$$y + 1 = -\frac{6}{7}(x + 6)$$

$$y + 1 = -\frac{6}{7}x - \frac{36}{7}$$

$$y + 1 - 1 = -\frac{6}{7}x - \frac{36}{7} - 1$$

$$y = -\frac{6}{7}x - \frac{36}{7} - \frac{7}{7}$$

$$y = -\frac{6}{7}x - \frac{(36+7)}{7}$$

$$y = -\frac{6}{7}x - \frac{43}{7}$$

53 Find the value

$x^2 - 4x + 1$ if $x = -2$

$(-2)^2 - 4(-2) + 1 =$

$(-2)(-2) - 4(-2) + 1 =$

$4 + 8 + 1 =$

$12 + 1 =$

$13 =$

54) Part 1 an equation in Standard form of the line that contains the point $(-1, 3)$ and is parallel to $y = 5x + 6$

$m = 5$ slope (parallel) $(-1, 3)$ point x_1, y_1

$y - y_1 = m(x - x_1)$

$y - (3) = 5(x - (-1))$

$y - 3 = 5(x + 1)$

$y - 3 = 5x + 5$

$y - 3 + 3 = 5x + 5 + 3$ slope intercept form

$y = 5x + 8$ ← OR

$y - 5x = 5x + 8 - 5x$

$y - 5x = 8$

$-5x + y = 8$

$-1(-5x + y) = -1(8)$

$5x - y = -8$ Standard form

(54) Part 2 Write an equation in Standard form of the line that contains the point $(-1, 3)$ and is perpendicular to the line $y = 5x + 6$

$m_{per} = -\frac{1}{5}$ $(-1, 3)$ point

x_1, y_1

$y - y_1 = m(x - x_1)$

$y - (3) = -\frac{1}{5}(x - (-1))$

$y - 3 = -\frac{1}{5}(x + 1)$

$y - 3 = -\frac{1}{5}x - \frac{1}{5}$

$y - 3 + 3 = -\frac{1}{5}x - \frac{1}{5} + 3$

$y = -\frac{1}{5}x - \frac{1}{5} + \frac{3}{1}\left(\frac{5}{5}\right)$

$y = -\frac{1}{5}x - \frac{1}{5} + \frac{15}{5}$

$y = -\frac{1}{5}x + \left(\frac{-1+15}{5}\right)$

$y = -\frac{1}{5}x + \frac{14}{5}$ slope intercept form

$y + \frac{1}{5}x = -\frac{1}{5}x + \frac{14}{5} + \frac{1}{5}x$

$y + \frac{1}{5}x = \frac{14}{5}$

$5\left(y + \frac{1}{5}x\right) = 5\left(\frac{14}{5}\right)$

$5y + \frac{5}{5}x = 14$

$5y + 1x = 14$

$5y + x = 14$

$x + 5y = 14$ standard form

55. $f(x) = x + 3$

$f(-3) = (-3) + 3$

$f(-3) = -3 + 3$

$f(-3) = 0$

$f(0) = (0) + 3$

$f(0) = 0 + 3$

$f(0) = 3$

$f(3) = (3) + 3$

$f(3) = 3 + 3$

$f(3) = 6$

56) $f(x) = x^2 + 5$

$f(-3) = (-3)^2 + 5$

$f(-3) = (-3)(-3) + 5$

$f(-3) = 9 + 5$

$f(-3) = 14$

$f(0) = (0)^2 + 5$

$f(0) = (0)(0) + 5$

$f(0) = 0 + 5$

$f(0) = 5$

$f(1) = (1)^2 + 5$

$f(1) = (1)(1) + 5$

$f(1) = 1 + 5$

$f(1) = 6$

57) $f(x) = |x+9|$

$f(8) = |(8)+9|$

$f(8) = |8+9|$

$f(8) = |17|$

$f(8) = 17$

$f(-7) = |(-7)+9|$

$f(-7) = |-7+9|$

$f(-7) = |2|$

$f(-7) = 2$

$f(0) = |(0)+9|$

$f(0) = |0+9|$

$f(0) = |9|$

$f(0) = 9$

(58) $h(x) = 3x^2 + 2$

$h(-2) = 3(-2)^2 + 2$

$h(-2) = 3(-2)(-2) + 2$

$h(-2) = 3(4) + 2$

$h(-2) = 12 + 2$

$h(-2) = 14$

$h(0) = 3(0)^2 + 2$

$h(0) = 3(0)(0) + 2$

$h(0) = 3(0) + 2$

$h(0) = 0 + 2$

$h(0) = 2$

$h(4) = 3(4)^2 + 2$

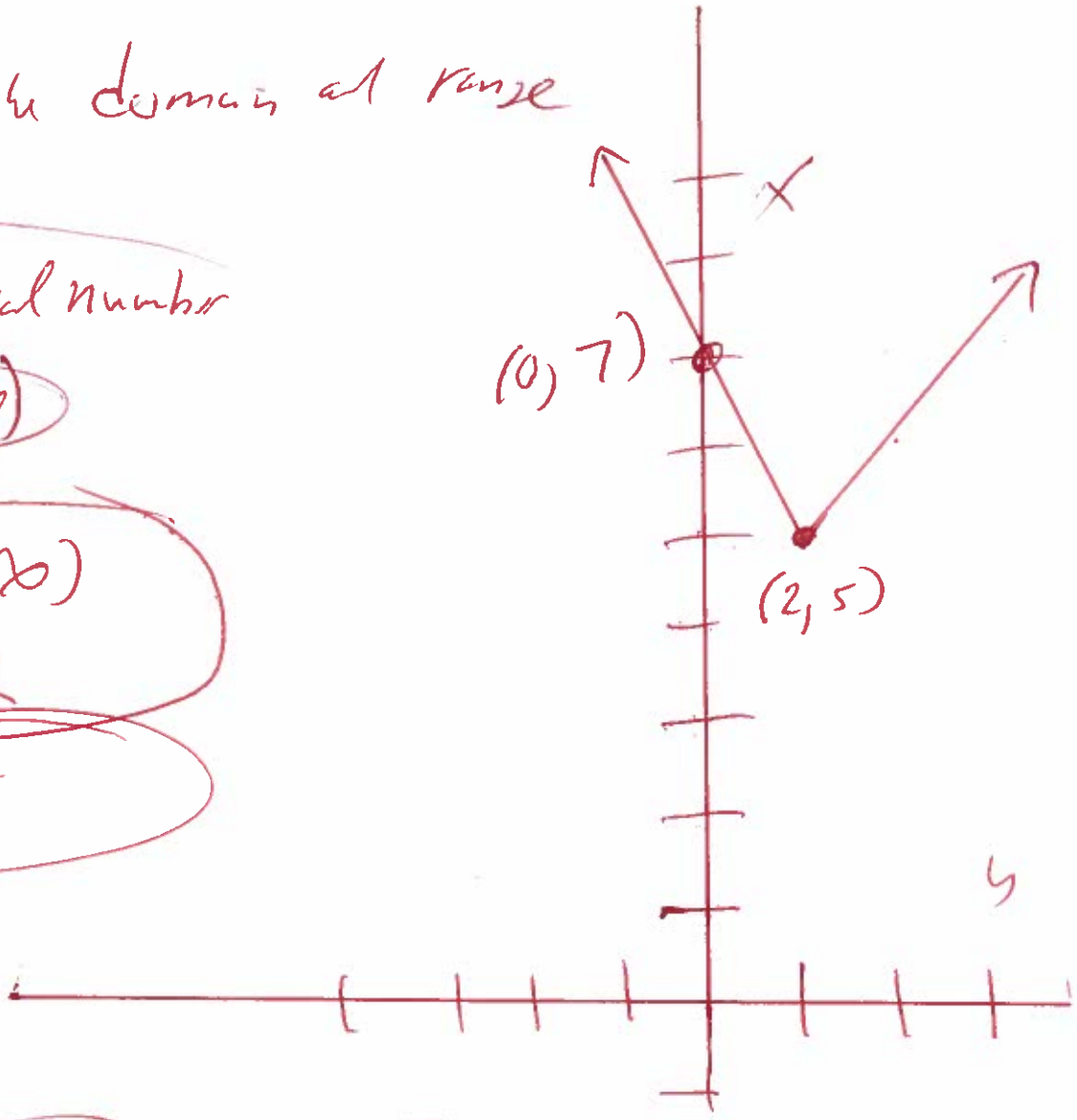
$h(4) = 3(4)(4) + 2$

$h(4) = 3(16) + 2$

$h(4) = 48 + 2$

$h(4) = 50$

(59) Find the domain and range



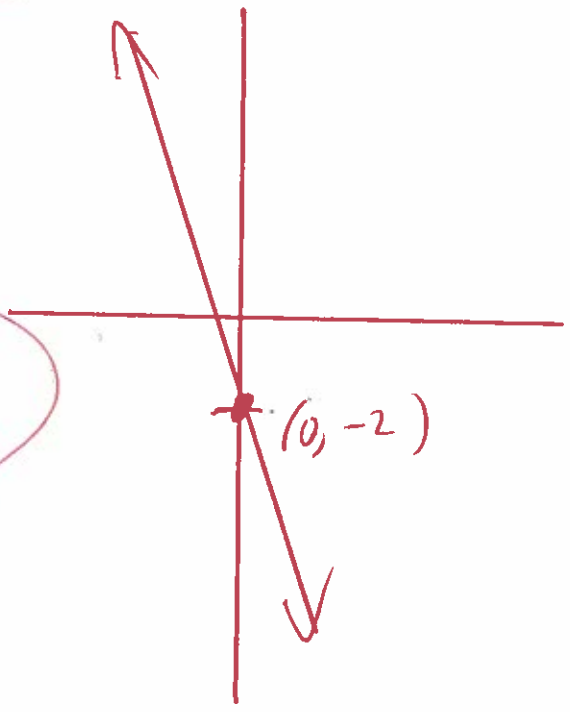
domain all real number

$(-\infty, \infty)$

range $[5, \infty)$

$y \geq 5$

(60) Find domain and range



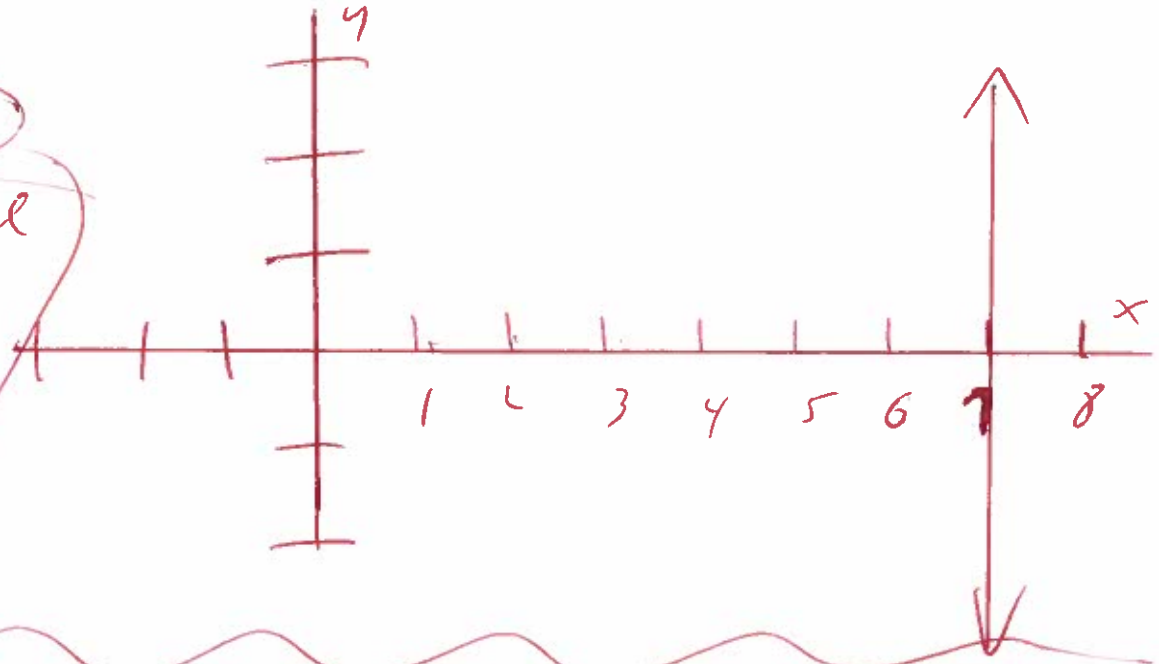
domain all real numbers

$(-\infty, \infty)$

range all real numbers

$(-\infty, \infty)$

(61) find the domain and range

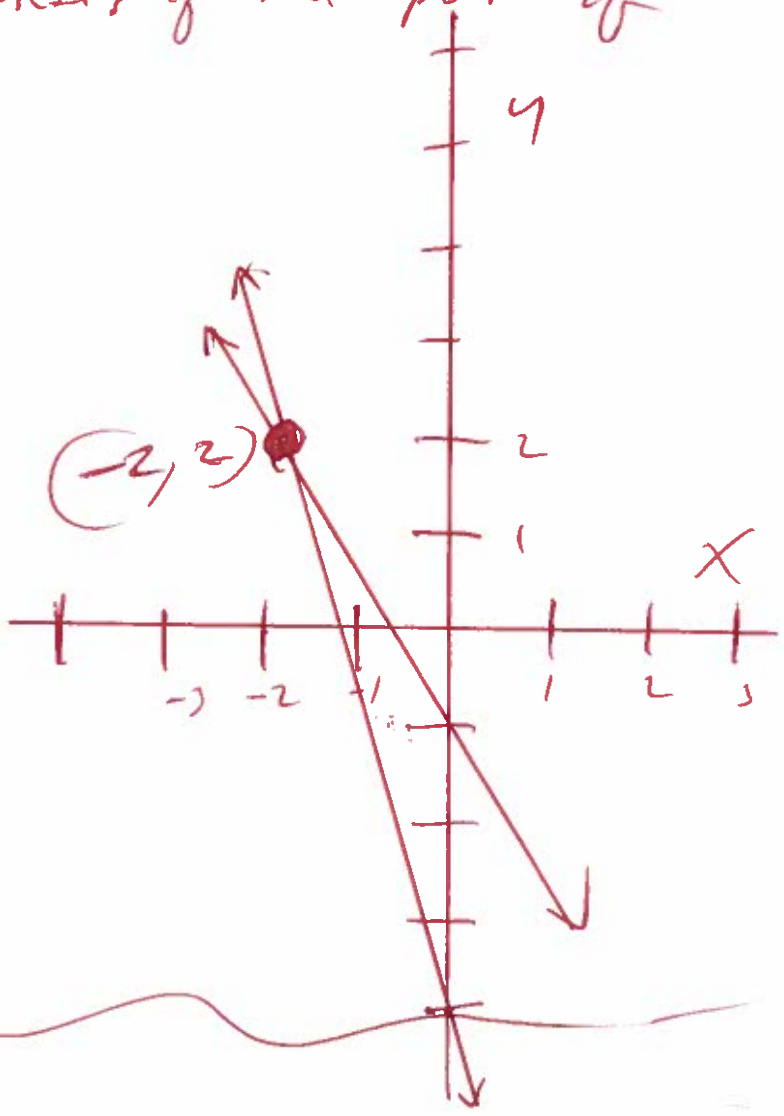


domain {7}

range all real numbers

$(-\infty, \infty)$

(62) find the coordinates of the point of intersection



Solution

$(-2, 2)$

63. $f(x) = -9x + 5$

$f(3) = -9(3) + 5$

$f(3) = -27 + 5$

$f(3) = -22$ ✓

$f(r) = -9(r) + 5$

$f(r) = -9r + 5$ ✓

64. $f(x) = x^2 + 10$

$f(10) = (10)^2 + 10$

$f(10) = (10)(10) + 10$

$f(10) = 100 + 10$

$f(10) = 110$ ✓

$f(a) = (a)^2 + 10$

$f(a) = a^2 + 10$ ✓

(65.) determine whether each ordered pair is a solution of the system of linear equations

$x + y = 7$

$3x + 2y = 15$

$(1, 6)$
$x \quad y$

$(1) + (6) = 7$

$1 + 6 = 7$

$7 = 7$ ✓ Good

YES $(1, 6)$ is a solution ✓

$3(1) + 2(6) = 15$

$3 + 12 = 15$

$15 = 15$ ✓ Good

$x + y = 7$

$3x + 2y = 15$

$(3, 4)$
$x \quad y$

$(3) + (4) = 7$

$3 + 4 = 7$

$7 = 7$ ✓ Good

~~NO~~ $(3, 4)$ is not a solution ✗

$3(3) + 2(4) = 15$

$9 + 8 = 15$

$17 \neq 15$ BAD

66. Solve the system

$$2x+3y=8$$
$$3x-3y=-3$$

$$5x+0=5$$

$$5x=5$$

$$\frac{5x}{5}=\frac{5}{5}$$

$$x=1$$

Subst

$$2x+3y=8$$

$$2(1)+3y=8$$

$$2+3y=8$$

$$3y=8-2$$

$$3y=6$$

$$\frac{3y}{3}=\frac{6}{3}$$

$$y=2$$

$$(x, y)=(1, 2)$$

(6?) Solve the system

$$x+4y=-2$$
$$2x+5y=-7$$

$(x+4y=-2)(-5)$ Mult

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

$$-5x-20y=10$$
$$8x+20y=-28$$

$$3x=-18$$

$$\frac{3x}{3}=\frac{-18}{3}$$

$$x=-6$$

$$\frac{4y}{4}=\frac{4}{4}$$

$$y=1$$

Subst

$$x+4y=-2$$
$$(-6)+4y=-2$$
$$-6+4y=-2$$
$$+6+4y+6=-2+6$$
$$4y=4$$

$(x, y)=(-6, 1)$ ✓

(68)

$B - H = 87$

$B + H = 1519$

$2B + 0 = 1606$

$2B = 1606$

$\frac{2B}{2} = \frac{1606}{2}$

$B = 803$

Subst

$B - H = 87$

$803 - H = 87$

$803 - H - 803 = 87 - 803$

$-H = -716$

$-1(-H) = -1(-716)$

$H = 716$

$(B, H) = (803, 716)$

69.

$3A + 4C = 94$
$2A + 3C = 66$

$(3A + 4C = 94)\ (-3)$ Mult
$(2A + 3C = 66)\ (4)$

$-9A - 12C = -282$
$8A + 12C = 264$

$-1A + 0 = -18$

$-1A = -18$

$-1(-1A) = -1(-18)$

$A = 18$

Subst

$3A + 4C = 94$

$3(18) + 4C = 94$

$54 + 4C = 94$

$54 + 4C - 54 = 94 - 54$

$4C = 40$

$\frac{4C}{4} = \frac{40}{4}$

$C = 10$

$(A, C) = (18, 10)$ ✓

(20)

$Q + N = 66$ (1)

$.25Q + .05N = 7.30$ (100)

Mult

$1Q + 1N = 66$

$25Q + 5N = 730$

$(1Q + 1N = 66)(-5)$

$(25Q + 5N = 730)(1)$

$-5Q - 5N = -330$

$25Q + 5N = 730$

$20Q + 0 = 400$

$20Q = 400$

$\frac{20Q}{20} = \frac{400}{20}$

$Q = 20$

Subst

$Q + N = 66$

$(20) + N = 66$

Mult $20 + N = 66$

$20 + N - 20 = 66 - 20$

$N = 46$

$(Q, N) = (20, 46)$

71) $(5a-5)(5a^2+2a-3)$

$25a^3+10a^2-15a-25a^2-10a+15=$

$25a^3-15a^2-25a+15=$

72) $\dfrac{p^{-2}}{p^{-4}}=$

$\dfrac{p^4}{p^2}=$ Pawrik

73. $\frac{a^{-4}}{a^{-8}} =$

$\frac{a^{8}}{a^{4}} =$ rewrite

$a^{8-4} =$

$a^{4} =$

74. $(a^{-5}b^{3})^{-7} =$

$a^{-5(-7)}\,b^{3(-7)} =$

$a^{35}\,b^{-21} =$

$\frac{a^{35}}{b^{21}} =$ rewrite

(75) $\dfrac{(a^4b^{-5})^{-5}}{(2a^3b^{-1})^{-2}} =$

$\dfrac{(a^4b^{-5})^{-5}}{(2^1a^3b^{-1})^{-2}}$

$\dfrac{a^{4(-5)}b^{-5(-5)}}{2^{1(-2)}a^{3(-2)}b^{-1(-2)}} =$

$\dfrac{a^{-20}b^{25}}{2^{-2}a^{-6}b^{2}} =$

$\dfrac{2^2a^6b^{25}}{a^{20}b^2} =$

$\dfrac{(2)(2)b^{25-2}}{a^{20-6}} =$

$\dfrac{4b^{23}}{a^{14}} =$

(76) $(7x^2+13x+9) \div (x+1) =$

$\frac{7x^2+13x+9}{x+1} =$ divide use Synthetic division

$$\begin{array}{r|rrr} -1 & 7 & 13 & 9 \\ & & -7 & -6 \\ \hline & 7 & 6 & 3 \text{ rem} \end{array}$$

$$7x+6+\frac{3}{x+1}$$

OR Long division

$$7x+6+\frac{3}{x+1}$$

$$x+1 \overline{)\,7x^2+13x+9}$$

$$-(7x^2+7x) \quad \downarrow$$

$$0+6x+9$$

$$-(6x+6)$$

$$0+3 \text{ Rem}$$

(77) factor out the greatest common factor

GCF

$2x + 28 =$

$2(x + 14) =$

(78.) factor the four-term polynomial by grouping

$x^3 + 2x^2 + 9x + 18 =$

$(x^3 + 2x^2) + (9x + 18) =$

$x^2(x + 2) + 9(x + 2) =$

$(x + 2)(x^2 + 9) =$

(79) factor by grouping

$4x^2 - 16xy - 3x + 12y =$

$(4x^2 - 16xy) + (-3x + 12y) =$

$4x(x - 4y) - 3(x - 4y) =$

$(x - 4y)(4x - 3) =$

(80) factor

$4xy - 6x^2 =$

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

(81) $-16x^6y^3 - 28x^9y^2 =$

$4x^6y^2(-4y^1 - 7x^3) =$

$4x^6y^2(-4y - 7x^3) =$

(82) factor

$x^2 - 16x + 63 =$

$(x-7)(x-9) =$

possible

$63 \cdot 1$

$21 \cdot 3$

$9 \cdot 7$

foil check

$(x-7)(x-9) =$

$x^2 - 9x - 7x + 63 =$

$x^2 - 16x + 63 =$ ✓

83. Factor

$x^2 - 5x - 36 =$

$(x+4)(x-9) =$

Possible

36.1

18.2

6.6

4.9

12.3

Check

$(x+4)(x-9) =$

$x^2 - 9x + 4x - 36 =$

$x^2 - 5x - 36 =$ ✓

84. Factor

$5t - 14 + t^2 =$

$t^2 + 5t - 14 =$ Rewrite

$(t-2)(t+7) =$

Possible

14.1

2.7

Check

$(t-2)(t+7) =$

$t^2 + 7t - 2t - 14 =$

$t^2 + 5t - 14 =$ ✓

(85) factor

$49x^2 - 121y^2 =$

$(7x)^2 - (11y)^2 =$

$(7x+11y)(7x-11y) =$

formula

$a^2 - b^2$

$(a+b)(a-b)$

Check

$(7x+11y)(7x-11y) =$

$49x^2 - 77xy + 77xy - 121y^2 =$

$49x^2 - 121y^2 =$ ✓

(86) Solve

$(x-1)(x+5) = 0$

Let $x-1=0$ OR $x+5=0$

$x-1+1=0+1$ OR $x+5-5=0-5$

$x=1$ OR $x=-5$

87. Solve

$3x(x-5)=0$

Let $3x=0$ OR $x-5=0$

$\frac{3x}{3}=\frac{0}{3}$ OR $x-5+5=0+5$

$x=0$ OR $x=5$

88. Solve

$(3x+7)(2x-5)=0$

Let $3x+7=0$ OR $2x-5=0$

$3x+7-7=0-7$ OR $2x-5+5=0+5$

$3x=-7$ OR $2x=5$

$\frac{3x}{3}=\frac{-7}{3}$ OR $\frac{2x}{2}=\frac{5}{2}$

$x=\frac{-7}{3}$ OR $x=\frac{5}{2}$

89

Solve

$x^2 - 10x + 16 = 0$

$(x - 2)(x - 8) = 0$

Let $x - 2 = 0$ OR $x - 8 = 0$

$x - 2 + 2 = 0 + 2$ OR $x - 8 + 8 = 0 + 8$

$x = 2$ OR $x = 8$

Possible

16.1

8.2

4.4

90

Solve

$x^2 + 3x - 28 = 0$

$(x - 4)(x + 7) = 0$

Let $x - 4 = 0$ OR $x + 7 = 0$

$x - 4 + 4 = 0 + 4$ OR $x + 7 - 7 = 0 - 7$

$x = 4$ OR $x = -7$

28.1

14.2

7.4

(91.) Sol

$$x^2 - x = 0$$

$$x(x-1) = 0$$

Let $x = 0$ OR $x - 1 = 0$

OR $x - 1 + 1 = 0 + 1$

$$x = 1$$

(92.) Sol

$$x^2 - 8x = 20$$

$$x^2 - 8x - 20 = 20 - 20$$

$$x^2 - 8x - 20 = 0$$

$$(x + 2)(x - 10) = 0$$

20.1
10.2
4.5

Let $x + 2 = 0$ OR $x - 10 = 0$

$x + 2 - 2 = 0 - 2$ OR $x - 10 + 10 = 0 + 10$

$x = -2$ OR $x = 10$

93. Solve

$(x-1)(x+6) = 10x$

$x^2 + 6x - 1x - 6 = 10x$

$x^2 + 5x - 6 = 10x$

$x^2 + 5x - 6 - 10x = 10x - 10x$

$x^2 - 5x - 6 = 0$

$(x+1)(x-6) = 0$

Missed 6.1 2.3

so $x+1=0$ OR $x-6=0$

$x+1-1=0-1$ OR $x-6+6=0+6$

$x = -1$ OR $x = 6$

(94) Solve

$x^3 - 11x^2 + 18x = 0$

$x(x^2 - 11x + 18) = 0$

$x(x-2)(x-9) = 0$

Let $x = 0$ or $x - 2 = 0$ or $x - 9 = 0$

$x - 2 + 2 = 0 + 2$ or $x - 9 + 9 = 0 + 9$

$x = 2$ or $x = 9$

formula $a^2 - b^2 = (a+b)(a-b)$

possible 18.1, 9.2, 6.3

(95) Solve

$36x^3 - x = 0$

$x(36x^2 - 1) = 0$

$x((6x)^2 - (1)^2) = 0$

$x(6x+1)(6x-1) = 0$

Let $x = 0$ or $6x + 1 = 0$ or $6x - 1 = 0$

$6x + 1 - 1 = 0 - 1$ or $6x - 1 + 1 = 0 + 1$

$6x = -1$ or $6x = 1$

$\frac{6x}{6} = \frac{-1}{6}$ or $\frac{6x}{6} = \frac{1}{6}$

$x = -\frac{1}{6}$ or $x = \frac{1}{6}$

(96) Solve

$x^2 - 8 = -2x$

$x^2 - 8 + 2x = -2x + 2x$

$x^2 + 2x - 8 = 0$

$(x-2)(x+4) = 0$

Let $x-2=0$ OR $x+4=0$

$x-2+2 = 0+2$ OR $x+4-4 = 0-4$

$x = 2$ OR $x = -4$

Possible: 8.1, 2.4

(97) Solve

$9x^2 - 8x - 1 = 0$

$(9x+1)(x-1) = 0$

Let $9x+1=0$ OR $x-1=0$

$9x+1-1 = 0-1$ OR $x-1+1 = 0+1$

$9x = -1$ OR $x = 1$

$\frac{9x}{9} = \frac{-1}{9}$ OR

$x = -\frac{1}{9}$

Possible: 9.1, 1.1, 3.3

98. Solve

$x^2 + 14x + 49 = 0$

Possibly 49, 1, 7, 7

$(x+7)(x+7) = 0$

so $x+7=0$ or $x+7=0$

$x+7-7=0-7$ or $x+7-7=0-7$

$x=-7$ or $x=-7$

Answer $\{-7\}$

---

99. find the x-intercepts of the graph

$y = (2x+7)(x-9)$

find x-intercepts let $y=0$

$0 = (2x+7)(x-9)$

$2x+7=0$ or $x-9=0$

$2x+7-7=0-7$ or $x-9+9=0+9$

$2x=-7$ or $x=9$

$\frac{2x}{2} = \frac{-7}{2}$

$x = -\frac{7}{2}$

x-intercepts

$\left(-\frac{7}{2}, 0\right)$ or $(9, 0)$

(10) Find the x-intercepts of the graph

$y = x^2 - 4x - 45$

Find the x-intercepts let $y = 0$

Possible

45. 1

15. 3

9. 5

$0 = x^2 - 4x - 45$

$0 = (x+5)(x-9)$

$x+5=0$ OR $x-9=0$

$x+5-5=0-5$ OR $x-9+9=0+9$

$x=-5$ or $x=9$

$(-5, 0)$ OR $(9, 0)$

x-intercepts

(10.) Sketch

$y = (x+8)(x-7)$

set $(x+8)(x-7) = 0$

$x+8=0$ or $x-7=0$

$x+8-8=0-8$ $\quad x-7+7=0+7$

$x=-8$ or $x=7$

$(-8,0)$ $\quad (7,0)$

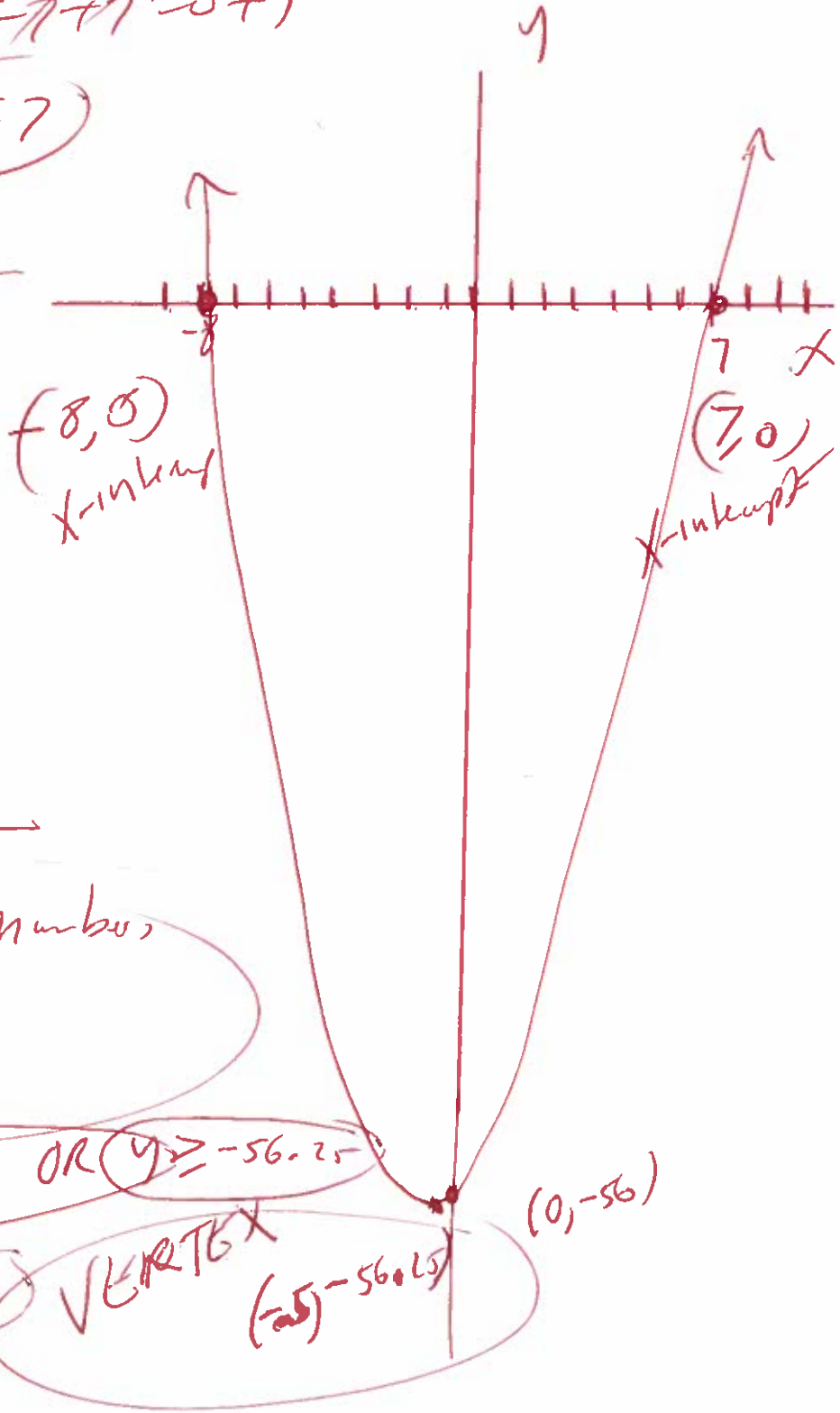
let $x=0$

$y=(0+8)(0-7)$

$y=(8)(-7)$

$y=-56$

$(0,-56)$



domain all real numbers OR $(-\infty, \infty)$

range $[-56.25, \infty)$ OR $(y \geq -56.25)$

VERTEX $(-.5, -56.25)$

(102) Graph

$y = x(x-1)$

or $x(x-1) = 0$

$x = 0$ or $x - 1 = 0$

$x - 1 + 1 = 0 + 1$

$x = 1$

x-Intercepts

(0, 0) and (1, 0)

Domain all real numbers

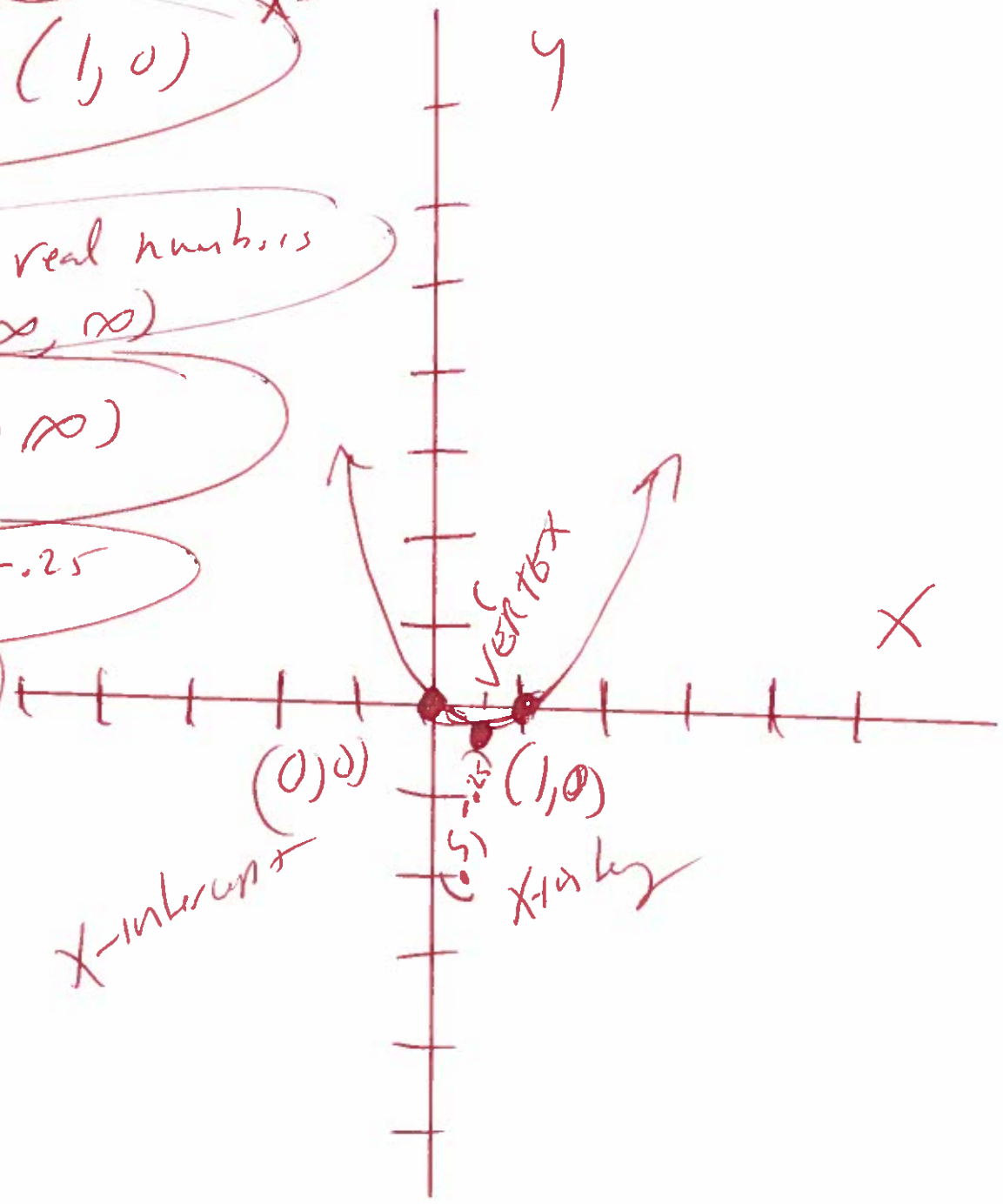
$(-\infty, \infty)$

Range $[-.25, \infty)$

OR

$y \geq -.25$

Vertex = (.5, -.25)



(103) Write a quadratic equation that has two solutions 6 and -5.

let $x=6$ OR $x=-5$

$x-6=6-6$ OR $x+5=-5+5$

$x-6=0$ OR $x+5=0$

$(x-6)(x+5)=0$

---

(104) find the dimensions of a rectangle whose width is 7 miles less than its length, and whose area is 78 square miles.

let x = length

$x-7$ = width

$A=LW$ area

$78=x(x-7)$

$78=x^2-7x$

$78-78=x^2-7x-78$

$0=x^2-7x-78$

$0=(x+6)(x-13)$

$x+6=0$ or $x-13=0$

$x+6-6=0-6$ OR $x-13+13=0+13$

$x=-6$ or $x=13$

Possible

78.1

39.2

13.6

only possible $x=13$ length

$x-7=$

$13-7=$ width

$6=$

length $=13$

width $=6$

105 Simplify

$$\frac{-2x-2y}{x+y} =$$

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

$$\frac{-2\cancel{(x+y)}}{\cancel{(x+y)}} =$$

$$-2 =$$

106 Simplify

$$\frac{x}{11x-77} \cdot \frac{x^2-7x}{5} =$$

$$\frac{x}{11(x-7)} \cdot \frac{x(x-7)}{5} =$$

$$\frac{x}{11\cancel{(x-7)}} \cdot \frac{x\cancel{(x-7)}}{5} =$$

$$\frac{x^2}{55} =$$

(107.) $\frac{14x^2}{y^9} \div \frac{2x^2y^9}{9} =$

$\frac{14x^2}{y^9} \cdot \frac{9}{2x^2y^9} =$ rewrite

$\frac{(14)(9)x^2}{2x^2y^{9+9}} =$

$\frac{(2)(7)(9)x^2}{(2)x^2y^{18}} =$

$\frac{63}{y^{18}} =$

(108.) $\frac{x^2+11x+28}{x-5} \div \frac{x^2+x-12}{x-5} =$

$\frac{x^2+11x+28}{x-5} \cdot \frac{x-5}{x^2+x-12} =$

$\frac{(x+4)(x+7)}{(x-5)} \cdot \frac{(x-5)}{(x-3)(x+4)} =$

$\frac{(x+4)(x+7)}{(x-5)} \cdot \frac{(x-5)}{(x-3)(x+4)} =$

$\frac{x+7}{x-3} =$

(109) $\frac{9}{5+y} + \frac{y+4}{5+y} =$

$\frac{(9)+(y+4)}{5+y} =$

$\frac{9+y+4}{5+y} =$

$\frac{y+13}{5+y} =$

(110) $\frac{v-5}{2} = \frac{v}{7}$

$7(v-5) = 2(v)$ cross mult

$7v - 35 = 2v$

$7v - 35 + 35 = 2v + 35$

$7v = 2v + 35$

$7v - 2v = 2v + 35 - 2v$

$5v = 35$

$\frac{5v}{5} = \frac{35}{5}$

$v = 7$

(iii) graph

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

$f(0) = -2(0) + 2$

$f(0) = 0 + 2$

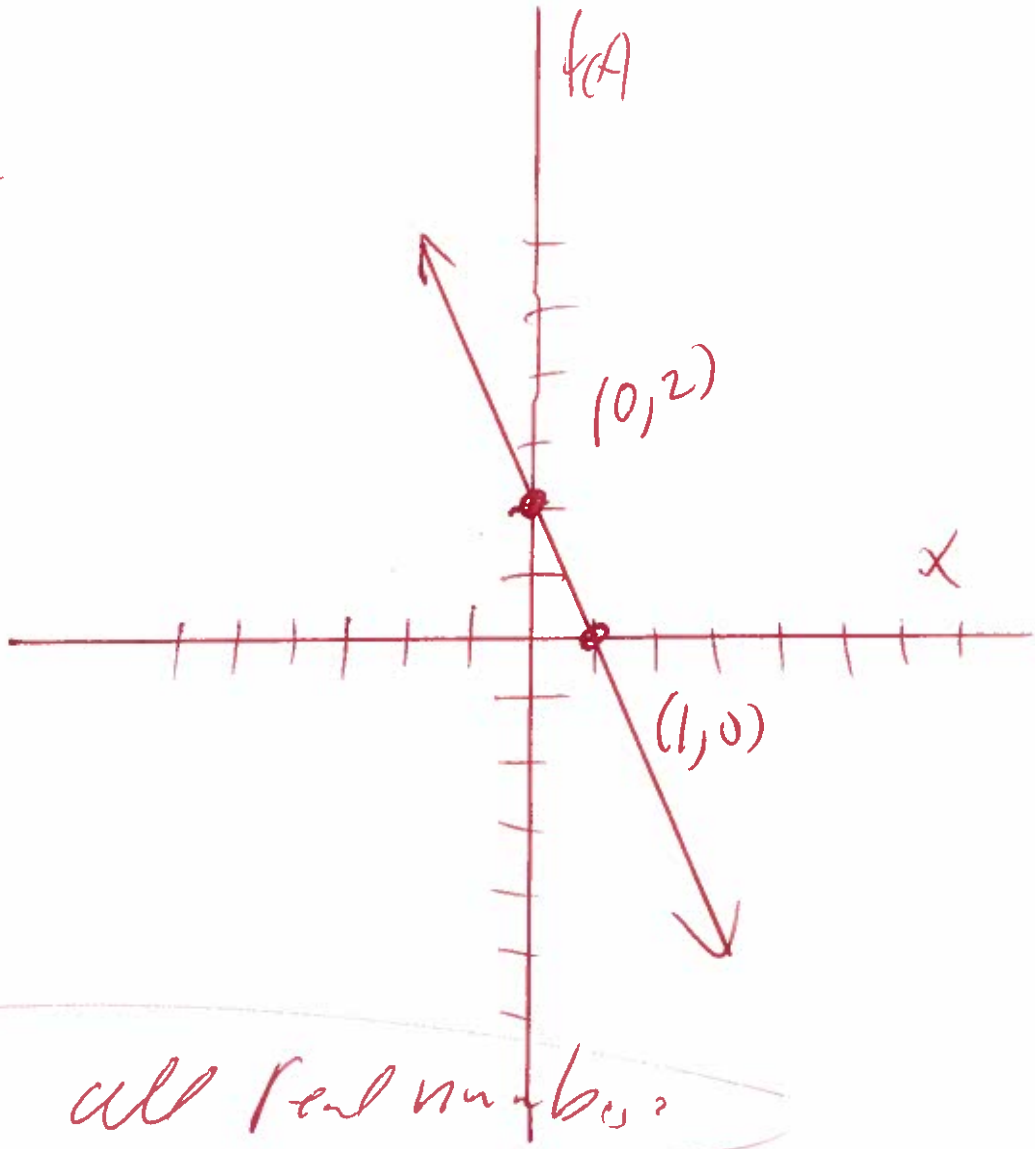
$f(0) = 2$

x	f(x)
0	2
1	0

$f(1) = -2(1) + 2$

$f(1) = -2 + 2$

$f(1) = 0$



Domain all real numbers

range all real numbers

(12) If y varies directly as x, find the constant of variation k and the direct variation equation for the situation.

$y = 2$ when $x = 4$

$y = kx$

$2 = k(4)$

$2 = 4k$

$\frac{2}{4} = \frac{4k}{4}$

$\frac{2(1)}{2(2)} = k$

$\frac{1}{2} = k$

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

(113) the amount P of pollution varies directly with the population N of people. City A has a population of 442,000 and produces 260,000 tons of pollutants. Find how many tons of pollution we should expect City B to produce, if we know that its population is 344,000.

$P = kN$

p = pollution

N = people population

$260000 = k(442000)$

$\frac{260000}{442000} = \frac{k(442000)}{442000}$

$.588235294 = k$

$p = .588235294\,N$

$p = .588235294\,(344000)$

$p = 202352.9412$

$p = 202,353$ Round

Solve

(114.) $|2x-1| = 3$

$|x| = a$

$x = -a$ or $x = a$

Let

$2x - 1 = -3$ or $2x - 1 = 3$

$2x - 1 + 1 = -3 + 1$ OR $2x - 1 + 1 = 3 + 1$

$2x = -2$ or $2x = 4$

$\frac{2x}{2} = \frac{-2}{2}$ or $\frac{2x}{2} = \frac{4}{2}$

$x = -1$ or $x = 2$

(115.) $|x-3| < 6$

$|x| < a$

$-a < x < a$

$-6 < x - 3 < 6$

$-6 + 3 < x - 3 + 3 < 6 + 3$

$-3 < x < 9$ ✓

$(-3, 9)$ ✓

116. $|x+8| \geq 18$

$|x| \geq a$

$x \leq -a$ or $x \geq a$

so

$x+8 \leq -18$ or $x+8 \geq 18$

$x+8-8 \leq -18-8$ or $x+8-8 \geq 18-8$

$x \leq -26$ or $x \geq 10$

$(-\infty, -26] \cup [10, \infty)$

(11) Graph $x+y \geq 3$

$x+y=3$

$x+y-x=3-x$

$y=3-x$

$y=3-(0)$

$y=3-0$

$y=3$

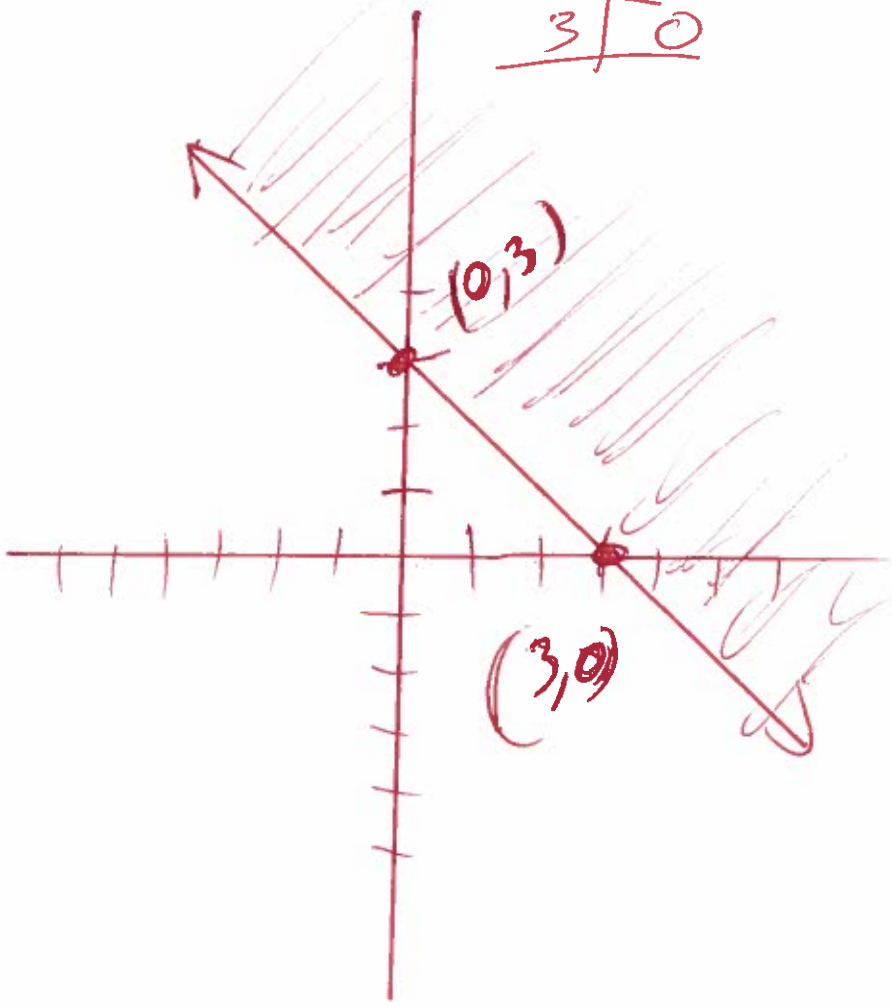
$y=3-x$

$y=3-(3)$

$y=3-3$

$y=0$

x	y
0	3
3	0



(118.) Determine whether $(1, 1)$ is included in the graph.
$x \quad y$

$$4x + 2y < 7$$

$$4(1) + 2(1) < 7$$

$$4 + 2 < 7$$

$$6 < 7$$

Yes

(119.) Simplify

$$\sqrt{81a^4b^{38}} =$$

$$\sqrt[2]{81a^4b^{38}} =$$

$$9a^{\frac{4}{2}}b^{\frac{38}{2}} =$$

$$9a^2b^{19} =$$

(#20) Identify the domain of then graph the function, using the table to the right.

$f(x) = \sqrt{x-5}$

x	f(x)
5	0
6	1
14	3
21	4

so $x - 5 \geq 0$

$x - 5 + 5 \geq 0 + 5$

$x \geq 5$

domain

$[5, \infty)$

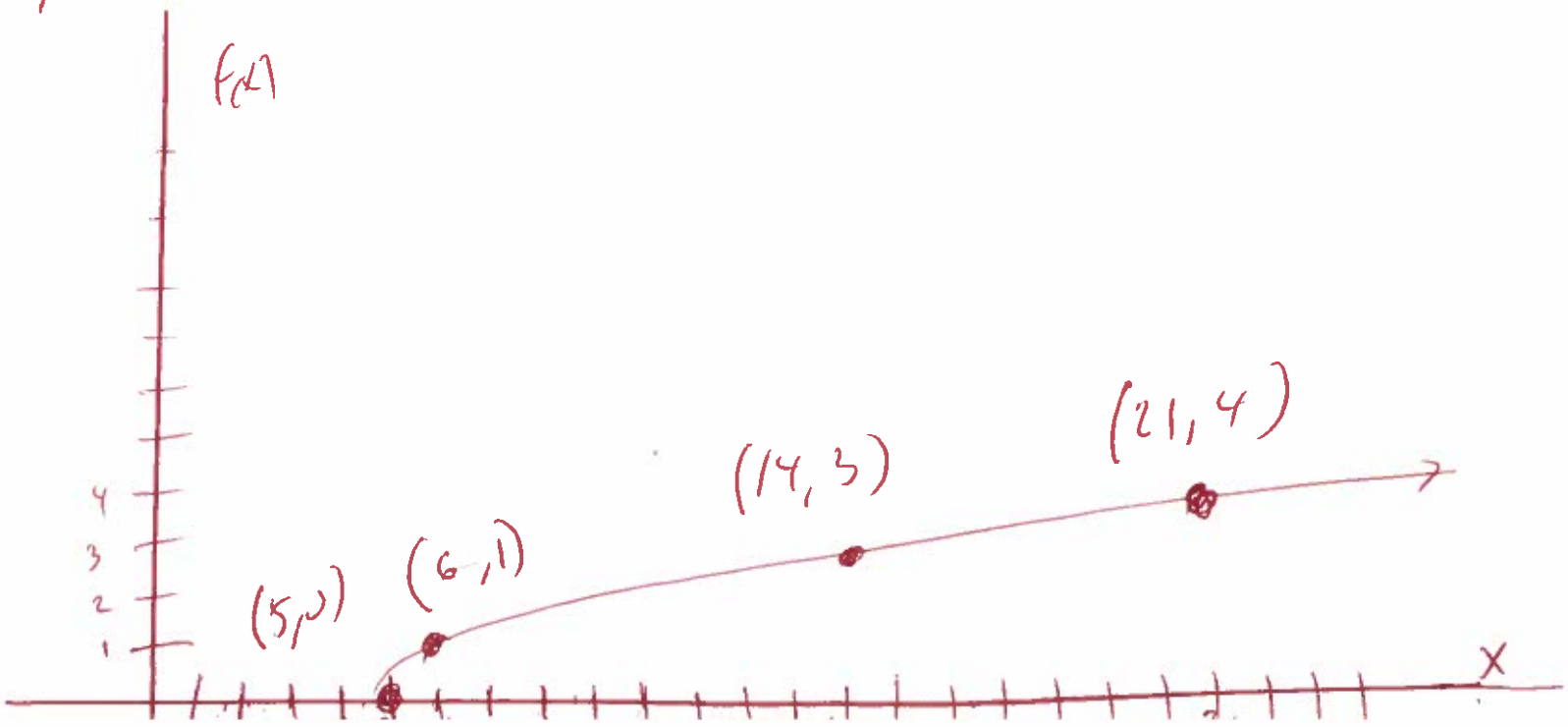
Range $[0, \infty)$

$f(5) = \sqrt{5-5} = \sqrt{0} = 0$

$f(6) = \sqrt{6-5} = \sqrt{1} = 1$

$f(14) = \sqrt{14-5} = \sqrt{9} = 3$

$f(21) = \sqrt{21-5} = \sqrt{16} = 4$



(121)

$(49x^4)^{\frac{1}{2}} =$

$(7^2x^4)^{\frac{1}{2}} =$

$7^{2(\frac{1}{2})} x^{4(\frac{1}{2})} =$

$7^{\frac{2}{1}(\frac{1}{2})} x^{\frac{4}{1}(\frac{1}{2})} =$

$7^{\frac{2}{2}} x^{\frac{4}{2}} =$

$7^1 x^2 =$

$7x^2 =$

Prime 2, 3, 5, 7

7 | 49

7 | 7

1

(122)

$1024^{\frac{2}{5}} =$

$(2^{10})^{\frac{2}{5}} =$

$2^{(\frac{10}{1})(\frac{2}{5})} =$

$2^{\frac{20}{5}} =$

$2^4 =$

$(2)(2)(2)(2) =$

$16 =$

Prime 2, 3, 5, 7

2 | 1024

2 | 512

2 | 256

2 | 128

2 | 64

2 | 32

2 | 16

2 | 8

2 | 4

2 | 2

1

(123) simplify

Prime 2, 3, 5, 7 ..

$\sqrt{24} =$

$\sqrt{4 \cdot 6} =$

$\sqrt{4}\sqrt{6} =$

$2\sqrt{6} =$

2 | 24
2 | 12
2 | 6
3 | 3
1

(124) simplify

Prime 2, 3, 5, 7 ..

$\sqrt{4x^7} =$

$\sqrt{4x^6x^1} =$

$2x^{6/2}\sqrt{x^1} =$

$2x^3\sqrt{x} =$

2 | 4
2 | 2
1

(25) $\sqrt{25a^6b^5} =$

$\sqrt{25a^6b^4b^1} =$ rewrite

$5a^{6/2}b^{4/2}\sqrt{b^1} =$

$5a^3b^2\sqrt{b} =$

OR

$\sqrt{25a^6b^5} =$

$(25a^6b^5)^{1/2}$

$(5^2a^6b^4b^1)^{1/2}$

$5^{2(1/2)}a^{6(1/2)}b^{4(1/2)}(b^1)^{1/2} =$

$5^{2/2}a^{6/2}b^{4/2}(b)^{1/2} =$

$5^1a^3b^2(b)^{1/2} =$

$5a^3b^2\sqrt{b}$

(126) rationalize the denominator

$$\frac{\sqrt{14}-\sqrt{13}}{\sqrt{14}+\sqrt{13}} =$$

$$\left(\frac{\sqrt{14}-\sqrt{13}}{\sqrt{14}+\sqrt{13}}\right)\left(\frac{\sqrt{14}-\sqrt{13}}{\sqrt{14}-\sqrt{13}}\right) =$$

$$\frac{(\sqrt{14})^2-\sqrt{14}\sqrt{13}-\sqrt{14}\sqrt{13}+(\sqrt{13})^2}{(\sqrt{14})^2-\sqrt{14}\sqrt{13}+\sqrt{14}\sqrt{13}-(\sqrt{13})^2} =$$

$$\frac{(\sqrt{14})^2-2\sqrt{14}\sqrt{13}+(\sqrt{13})^2}{(\sqrt{14})^2-(\sqrt{13})^2} =$$

$$\frac{14-2\sqrt{14}\sqrt{13}+13}{14-13} =$$

$$\frac{27-2\sqrt{14}\sqrt{13}}{1} =$$

$$27-2\sqrt{14}\sqrt{13} =$$

$$27-2\sqrt{(14)(13)} =$$

$$27-2\sqrt{182} =$$

(127.) rationalize the numerator

$$\frac{\sqrt{7}-2}{\sqrt{7}+2} =$$

$$\left(\frac{\sqrt{7}-2}{\sqrt{7}+2}\right)\left(\frac{\sqrt{7}+2}{\sqrt{7}+2}\right) =$$

$$\frac{(\sqrt{7})^2 + 2\sqrt{7} - 2\sqrt{7} - 4}{(\sqrt{7})^2 + 2\sqrt{7} + 2\sqrt{7} + (2)^2} =$$

$$\frac{(\sqrt{7})^2 - 4}{(\sqrt{7})^2 + 4\sqrt{7} + (2)^2} =$$

$$\frac{7-4}{7+4\sqrt{7}+4} =$$

$$\frac{3}{11+4\sqrt{7}} =$$

(128.) Solve

$$\sqrt{x-13} = 5$$

$$\left(\sqrt{x-13}\right)^2 = (5)^2$$

$$x - 13 = 25$$

$$x - 13 + 13 = 25 + 13$$

$$x = 38$$

Check

$$\sqrt{x-13} = 5$$

$$\sqrt{38-13} = 5$$

$$\sqrt{25} = 5$$

$$5 = 5 \checkmark$$

Good

(129.) $\sqrt{x+2} = \sqrt{2x-5}$

$(\sqrt{x+2})^2 = (\sqrt{2x-5})^2$

$x+2 = 2x-5$

$x+2-x = 2x-5-2$

$x = 2x-7$

$1x-2x = 2x-7-2x$

$-1x = -7$

$\frac{-1x}{-1} = \frac{-7}{-1}$

$x = 7$

Check

$\sqrt{x+2} = \sqrt{2x-5}$

$\sqrt{7+2} = \sqrt{2(7)-5}$

$\sqrt{9} = \sqrt{14-5}$

$\sqrt{9} = \sqrt{9}$

$3 = 3$

Good ✓

130. $(5-4i)+(2+3i)=$

$5-4i+2+3i=$

$7-1i=$

$7-i=$

131. $(8+4i)-(9-3i)=$

$8+4i-9+3i=$

$-1+7i=$

(132) $(5+9i)(9+i) =$

$45 + 5i + 81i + 9i^2 =$

$45 + 86i + 9i^2 =$

$45 + 86i + 9(-1) =$

$45 + 86i - 9 =$

$36 + 86i =$

formula

$i^2 = -1$

(33) $\frac{7-6i}{7+i} =$

$$\left(\frac{7-6i}{7+i}\right)\left(\frac{7-i}{7-i}\right) =$$

$$\frac{49 - 7i - 42i + 6i^2}{49 - 7i + 7i - i^2} =$$

$$\frac{49 - 49i + 6i^2}{49 - i^2} =$$

$$\frac{49 - 49i + 6(-1)}{49 - (-1)} =$$

$$\frac{49 - 49i - 6}{49 + 1} =$$

$$\frac{43 - 49i}{50} =$$

$$\frac{43}{50} - \frac{49}{50}i =$$

134) $(x+6)^2 = 16$

$\sqrt{(x+6)^2} = \pm\sqrt{16}$

$x+6 = \pm 4$

$x+6 = -4$ or $x+6 = 4$

$x+6-6 = -4-6$ or $x+6-6 = 4-6$

$x = -10$ or $x = -2$

Check

$(x+6)^2 = 16$

$(-10+6)^2 = 16$

$(-4)^2 = 16$

$(-4)(-4) = 16$

$16 = 16$

Good

$(x+6)^2 = 16$

$(-2+6)^2 = 16$

$(4)^2 = 16$

$(4)(4) = 16$

$16 = 16$

Good

(13) solve by completing the square

$$x^2 + 18x = -32$$

$$x^2 + 18x + \left(\tfrac{1}{2}(18)\right)^2 = -32 + \left(\tfrac{1}{2}(18)\right)^2$$

$$x^2 + 18x + (9)^2 = -32 + (9)^2$$

$$x^2 + 18x + 81 = -32 + 81$$

$$(x+9)(x+9) = 49$$

$$(x+9)^2 = 49$$

$$\sqrt{(x+9)^2} = \pm\sqrt{49}$$

$$x + 9 = \pm 7$$

$x + 9 = -7$ OR $x + 9 = 7$

$x + 9 - 9 = -7 - 9$ OR $x + 9 - 9 = 7 - 9$

$x = -16$ OR $x = -2$

(136) Use the quadratic formula

$1m^2 - 4m - 21 = 0$

$a = 1,\ b = -4,\ c = -21$

$$m = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$m = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-21)}}{2(1)}$$

$$m = \frac{4 \pm \sqrt{16 + 84}}{2}$$

$$m = \frac{4 \pm \sqrt{100}}{2}$$

$$m = \frac{4 \pm 10}{2}$$

$m = \frac{4+10}{2}$ or $m = \frac{4-10}{2}$

$m = \frac{14}{2}$ OR $m = \frac{-6}{2}$

$m = 7$ OR $m = -3$

(137.) Use the quadratic formula

$4y = 3y^2 - 7$

$0 = 3y^2 - 7 - 4y$ rewrite

$0 = 3y^2 - 4y - 7$

$3y^2 - 4y - 7 = 0$ rewrite

$a = 3,\ b = -4,\ c = -7$

$$y = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$y = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(3)(-7)}}{2(3)}$$

$$y = \frac{4 \pm \sqrt{16 + 84}}{6}$$

$$y = \frac{4 \pm \sqrt{100}}{6}$$

$$y = \frac{4 \pm 10}{6}$$

$y = \frac{4+10}{6}$ or $y = \frac{4-10}{6}$

$y = \frac{14}{6}$ or $y = \frac{-6}{6}$

$y = \frac{4(7)}{2(3)}$ $y = -\frac{6}{6}$

$y = \frac{7}{3}$ $y = -1$

(138.) use the quadratic formula

$1x^2+4x+8=0$

$a=1,\ b=4,\ c=8$

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$$x=\frac{-(4)\pm\sqrt{(4)^2-4(1)(8)}}{2(1)}$$

$$x=\frac{-4\pm\sqrt{16-32}}{2}$$

$$x=\frac{-4\pm\sqrt{-16}}{2}$$

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

$$x=-2\pm 2i$$

$x=-2-2i$ OR $x=-2+2i$

(13) Graph

$h(x) = x^2 + 5$

$h(-1) = (-1)^2 + 5$

$h(-1) = (-1)(-1) + 5$

$h(-1) = 1 + 5$

$h(-1) = 6$

$h(0) = (0)^2 + 5$

$h(0) = (0)(0) + 5$

$h(0) = 0 + 5$

$h(0) = 5$

$h(1) = (1)^2 + 5$

$h(1) = (1)(1) + 5$

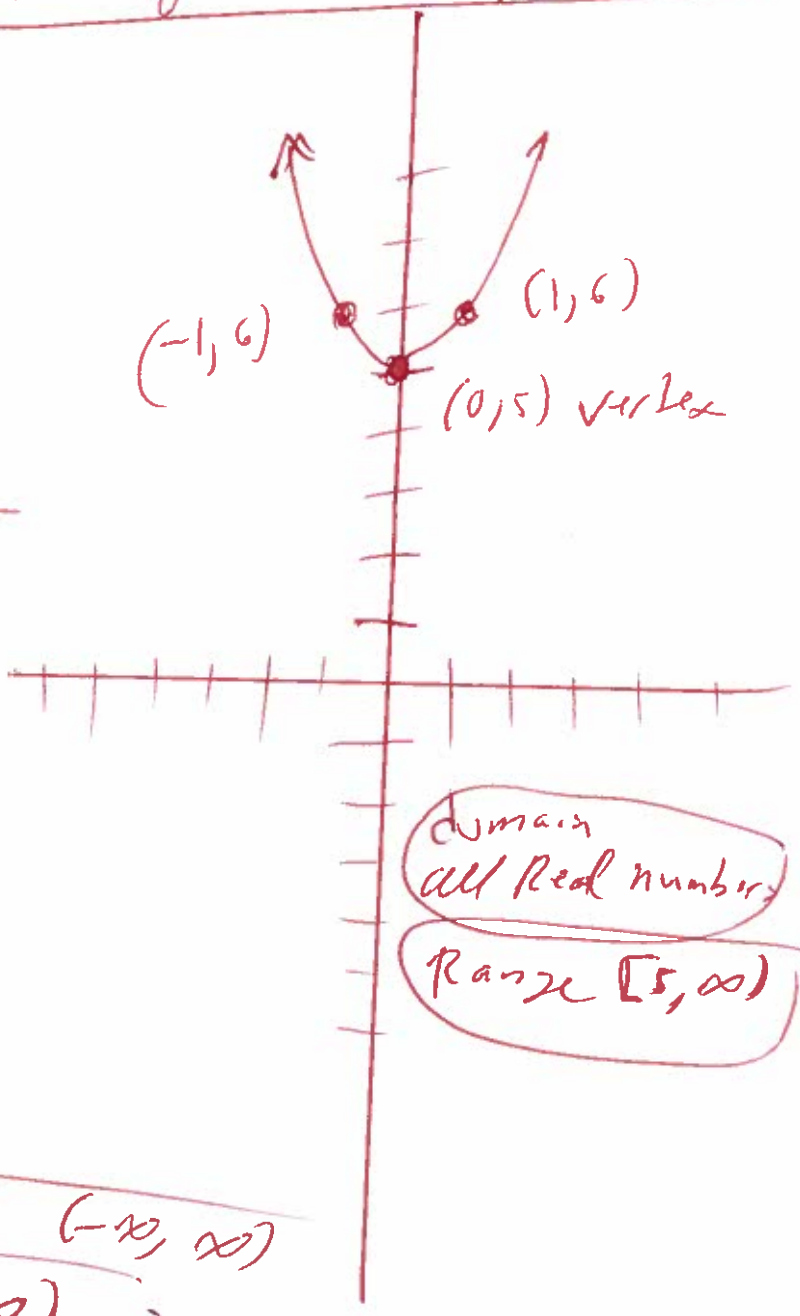
$h(1) = 1 + 5$

$h(1) = 6$

x	h(x)
-1	6
0	5
1	6

Vertex = (0, 5)

axis of symmetry $x = 0$



domain all Real numbers

Range $[5, \infty)$

domain all real numbers $(-\infty, \infty)$

Range $y \geq 5$ or $[5, \infty)$

(140) Sketch

$f(x) = (x-10)^2$

$f(9) = (9-10)^2$

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

$f(9) = (-1)(-1)$

$f(9) = 1$

$f(10) = (10-10)^2$

$f(10) = (0)^2$

$f(10) = (0)(0)$

$f(10) = 0$

$f(11) = (11-10)^2$

$f(11) = (1)^2$

$f(11) = (1)(1)$

$f(11) = 1$

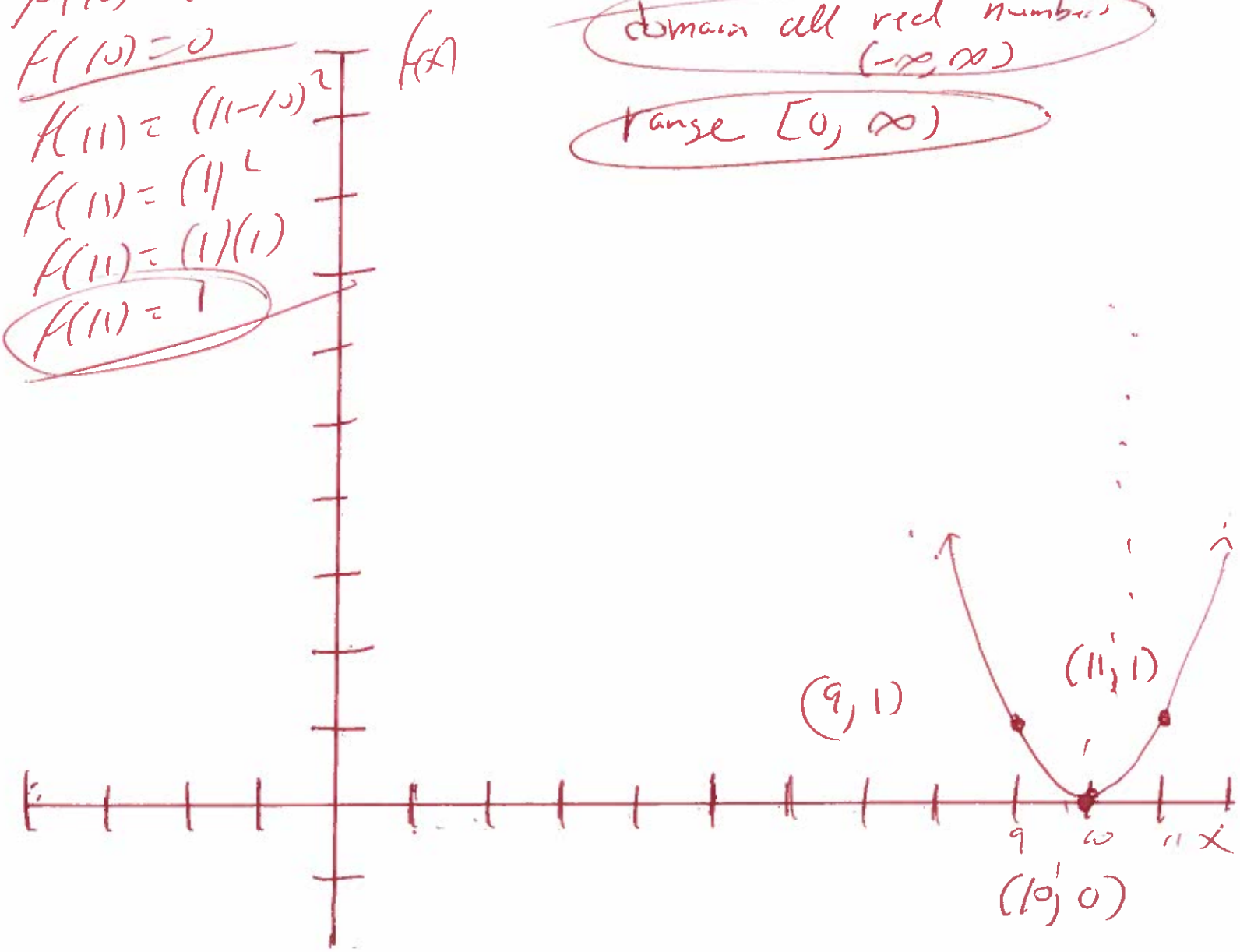
x	f(x)
9	1
10	0
11	1

Vertex = (10, 0)

axis of symmetry $x = 10$

domain all real numbers $(-\infty, \infty)$

range $[0, \infty)$



(141.) graph

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

$f(2) = \frac{1}{4}(2-6)^2 - 5$

$f(2) = \frac{1}{4}(-4)^2 - 5$

$f(2) = \frac{1}{4}(-4)(-4) - 5$

$f(2) = \frac{1}{4}(16) - 5$

$f(2) = 4 - 5$

$f(2) = -1$

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

$f(6) = \frac{1}{4}(6-6)^2 - 5$

$f(6) = \frac{1}{4}(0)^2 - 5$

$f(6) = \frac{1}{4}(0)(0) - 5$

$f(6) = \frac{1}{4}(0) - 5$

$f(6) = 0 - 5$

$f(6) = -5$

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

$f(10) = \frac{1}{4}(10-6)^2 - 5$

$f(10) = \frac{1}{4}(4)^2 - 5$

$f(10) = \frac{1}{4}(4)(4) - 5$

$f(10) = \frac{1}{4}(16) - 5$

$f(10) = 4 - 5$

$f(10) = -1$

$f(0) = \frac{1}{4}(0-6)^2 - 5$

$f(0) = \frac{1}{4}(-6)^2 - 5$

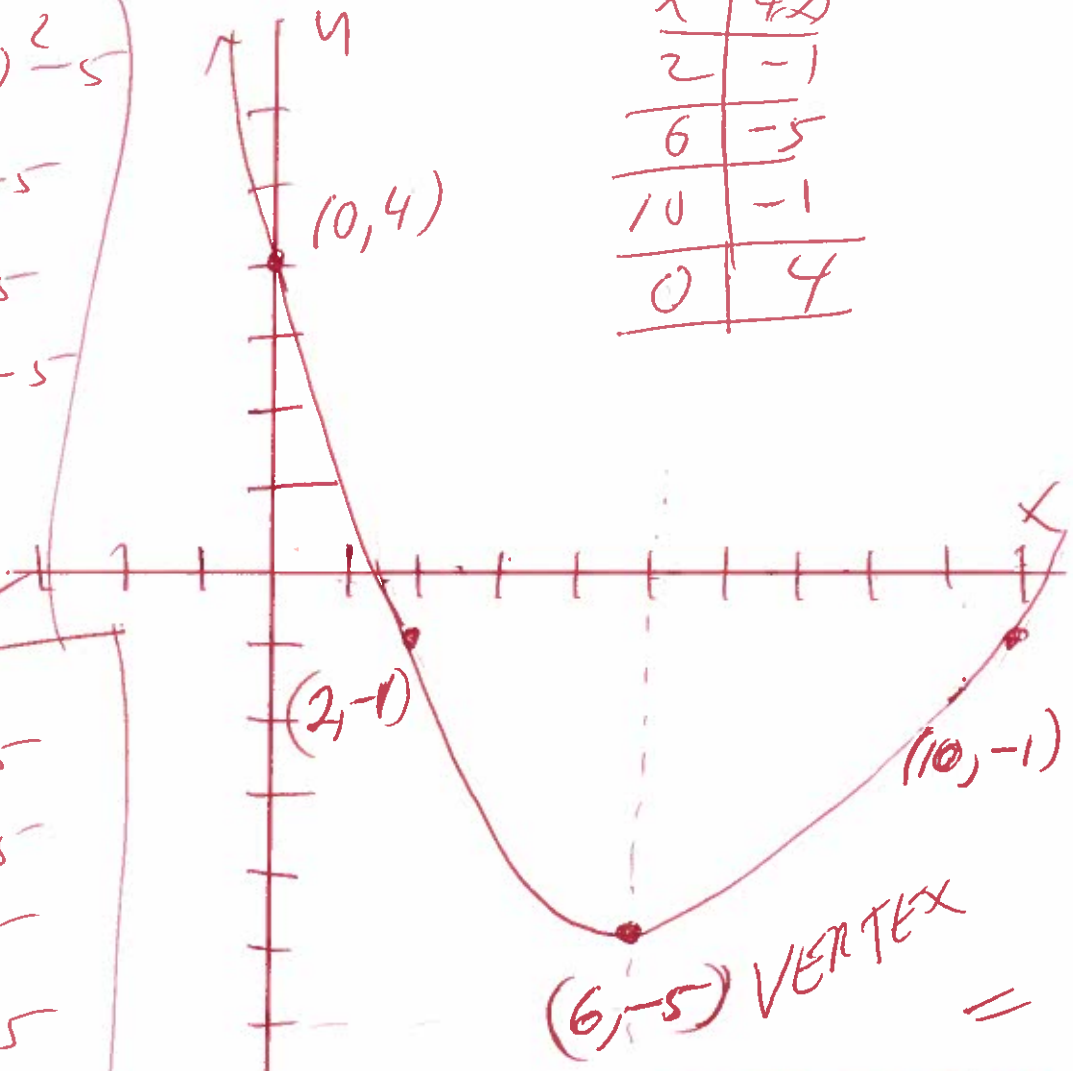
$f(0) = \frac{1}{4}(-6)(-6) - 5$

$f(0) = \frac{1}{4}(36) - 5$

$f(0) = 9 - 5$

$f(0) = 4$

x	f(x)
2	-1
6	-5
10	-1
0	4



domain all real numbers

Range $[-5, \infty)$

(4b) graph

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

$f(2) = -5(2-3)^2+1$

$f(2) = -5(-1)^2+1$

$f(2) = -5(-1)(-1)+1$

$f(2) = -5(1)+1$

$f(2) = -5+1$

$f(2) = -4$

x	f(x)
2	-4
3	1
4	-4

vertex = (3, 1)

axis of symmetry $x = 3$

domain: all real numbers $(-\infty, \infty)$

range: $(-\infty, 1]$

$f(3) = -5(3-3)^2+1$

$f(3) = -5(0)^2+1$

$f(3) = -5(0)(0)+1$

$f(3) = -5(0)+1$

$f(3) = 0+1$

$f(3) = 1$

$f(4) = -5(4-3)^2+1$

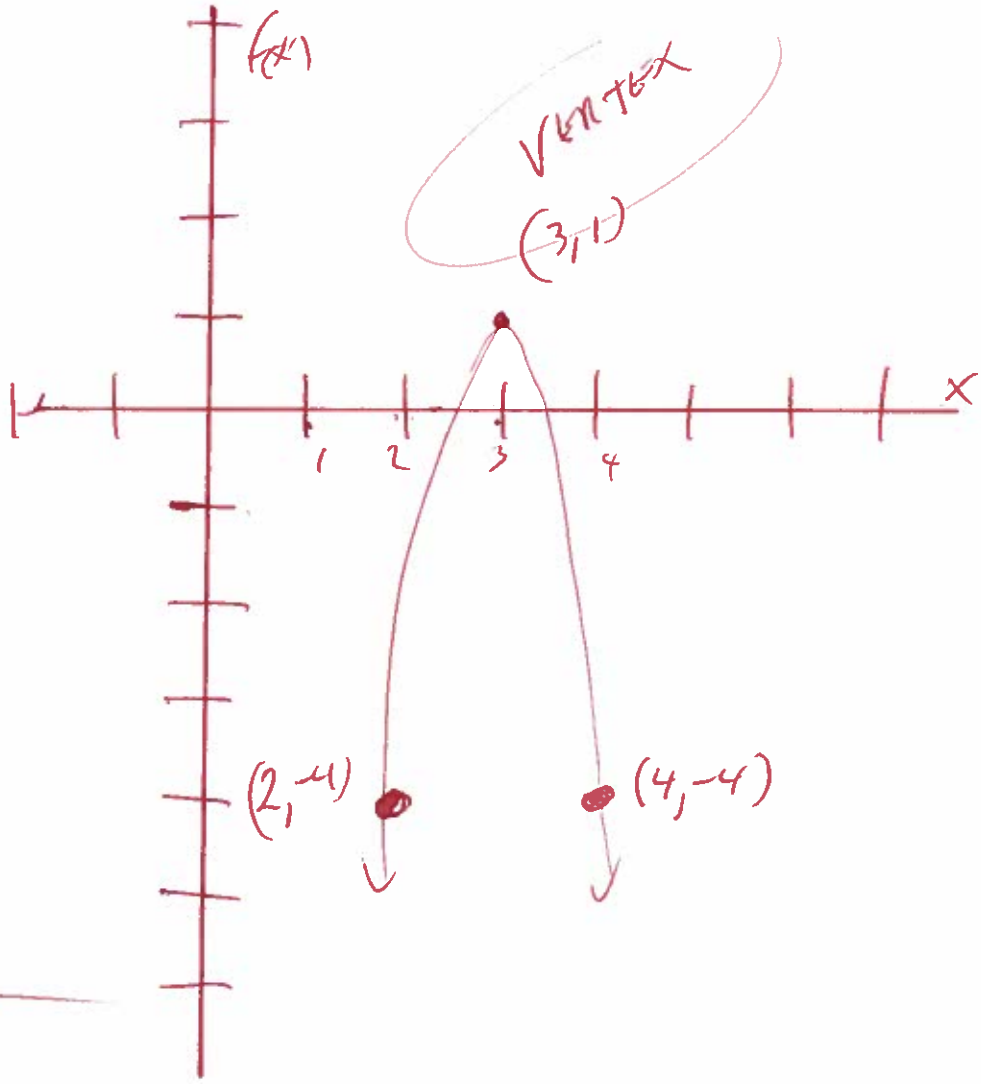
$f(4) = -5(1)^2+1$

$f(4) = -5(1)(1)+1$

$f(4) = -5(1)+1$

$f(4) = -5+1$

$f(4) = -4$



(143) Find the vertex

$f(x) = 4x^2 + 8x + 3$

$a=4,\ b=8,\ c=3$

$Vertex = \left(-\frac{b}{2a},\ f\left(-\frac{b}{2a}\right)\right)$

$Vertex = \left(-\frac{(8)}{2(4)},\ f\left(\frac{(8)}{2(4)}\right)\right)$

$Vertex = \left(-\frac{8}{8},\ f\left(\frac{8}{8}\right)\right)$

$Vertex = (-1,\ f(-1))$

$Vertex = (-1,\ 4(-1)^2 + 8(-1) + 3)$

$Vertex = (-1,\ 4(-1)(-1) + 8(-1) + 3)$

$Vertex = (-1,\ 4(1) + 8(-1) + 3)$

$Vertex = (-1,\ 4 - 8 + 3)$

$Vertex = (-1,\ -4 + 3)$

$Vertex = (-1, -1)$

$f(0) = 4(0)^2 + 8(0) + 3$

$f(0) = 4(0)(0) + 8(0) + 3$

$f(0) = 0 + 0 + 3$

$f(0) = 3$ ✓

$(0, 3)$ another point

Find

$f(-2) = 4(-2)^2 + 8(-2) + 3$

$f(-2) = 4(-2)(-2) + 8(-2) + 3$

$f(-2) = 4(4) + 8(-2) + 3$

$f(-2) = 16 - 16 + 3$

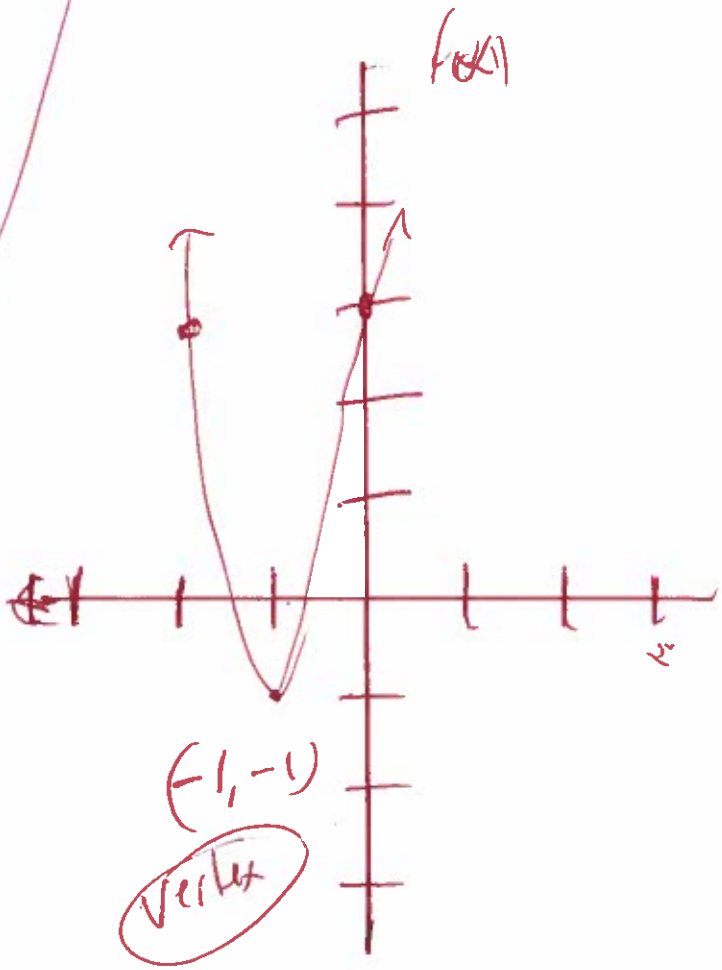
$f(-2) = 3$ another point $(-2, 3)$

Vertex $= (-1, -1)$

axis of symmetry $x = -1$

domain all real numbers $(-\infty, \infty)$

range $[-1, \infty)$



(14) graph

$f(x) = -x^2 - 4x - 3$

$a = -1,\ b = -4,\ c = -3$

$\text{Vertex} = \left(\frac{-b}{2a},\ f\left(\frac{-b}{2a}\right)\right)$

$\text{Vertex} = \left(\frac{-(-4)}{2(-1)},\ f\left(\frac{-(-4)}{2(-1)}\right)\right)$

$\text{Vertex} = \left(\frac{4}{-2},\ f\left(\frac{4}{-2}\right)\right)$

$\text{Vertex} = (-2,\ f(-2))$

$\text{Vertex} = (-2,\ -(-2)^2 - 4(-2) - 3)$

$\text{Vertex} = (-2,\ -(-2)(-2) - 4(-2) - 3)$

$\text{Vertex} = (-2,\ -(4) - 4(-2) - 3)$

$\text{Vertex} = (-2,\ -4 + 8 - 3)$

$\text{Vertex} = (-2,\ 4 - 3)$

$\text{Vertex} = (-2, 1)$ ✓

$f(0) = -(0)^2 - 4(0) - 3$

$f(0) = -(0)(0) - 4(0) - 3$

$f(0) = -(0) - 4(0) - 3$

$f(0) = 0 - 0 - 3$

$f(0) = -3$

$f(-3) = -(-3)^2 - 4(-3) - 3$

$f(-3) = -(-3)(-3) - 4(-3) - 3$

$f(-3) = -(9) - 4(-3) - 3$

$f(-3) = -9 + 12 - 3$

$f(-3) = 3 - 3$

$f(-3) = 0$

$f(-1) = -(-1)^2 - 4(-1) - 3$

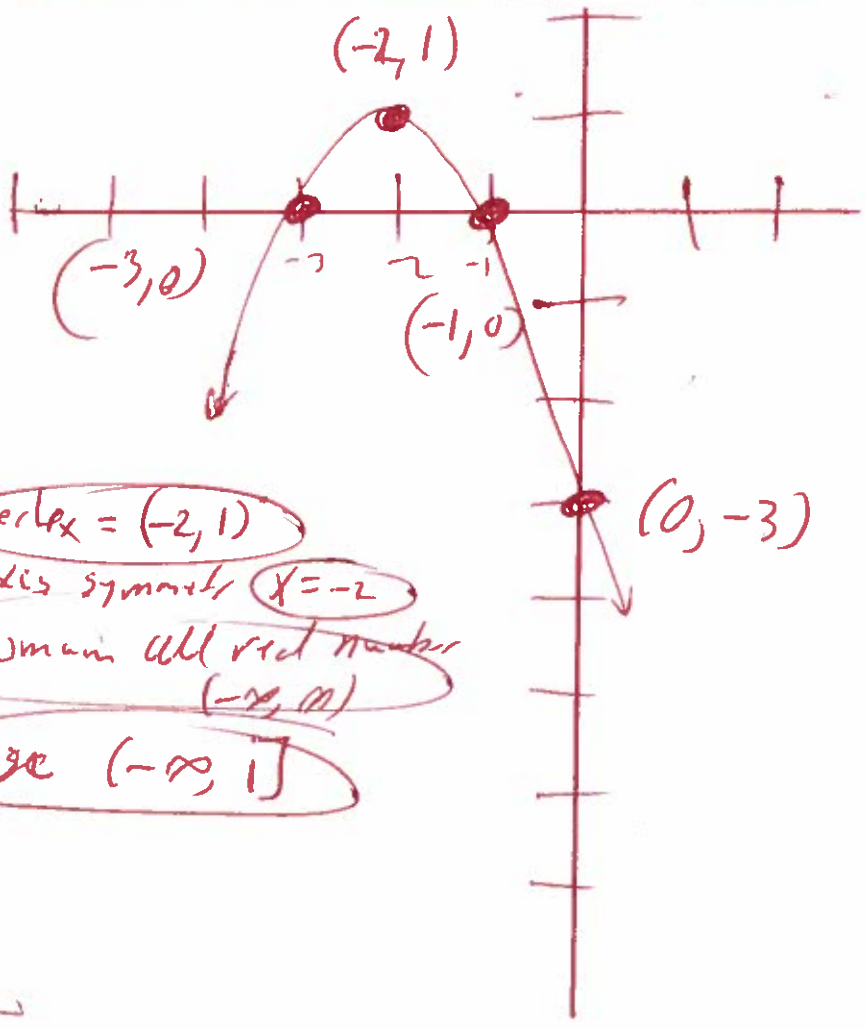
$f(-1) = -(-1)(-1) - 4(-1) - 3$

$f(-1) = -(1) - 4(-1) - 3$

$f(-1) = -1 + 4 - 3$

$f(-1) = 3 - 3$

$f(-1) = 0$ ✓



Vertex = (-2, 1)

axis symmetry $x = -2$

domain all real numbers $(-\infty, \infty)$

range $(-\infty, 1]$

(45) graph

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

x	f(x)
-1	0
0	-1
1	0

$f(-1) = (-1)^2 - 1$

$f(-1) = (-1)(-1) - 1$

$f(-1) = 1 - 1$

$f(-1) = 0$

$f(0) = (0)^2 - 1$

$f(0) = (0)(0) - 1$

$f(0) = 0 - 1$

$f(0) = -1$

$f(1) = (1)^2 - 1$

$f(1) = (1)(1) - 1$

$f(1) = 1 - 1$

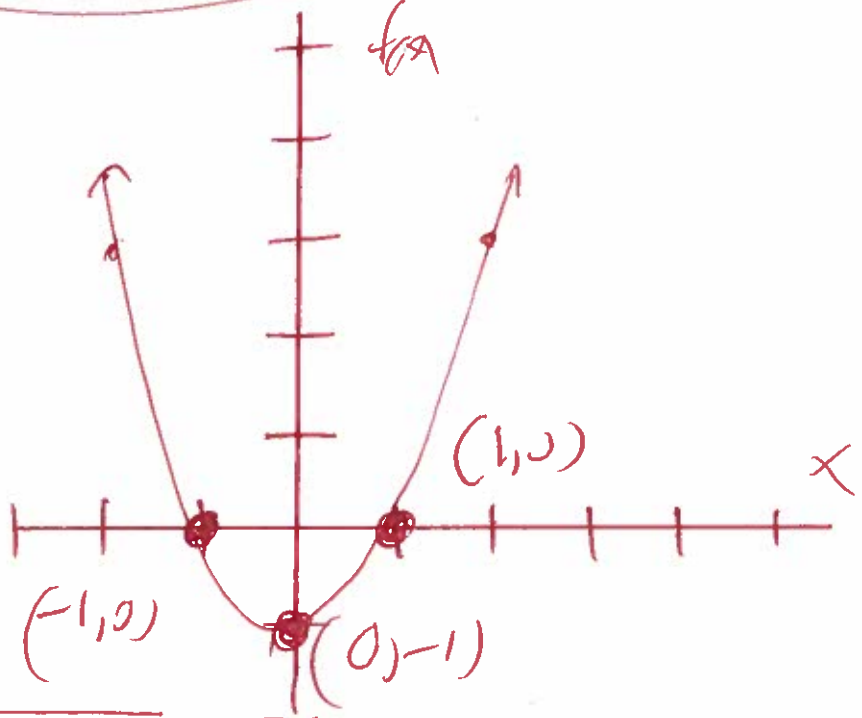
$f(1) = 0$

Vertex = (0, -1)

axis of symmetry $x = 0$

domain all real numbers $(-\infty, \infty)$

range $[-1, \infty)$



Find zeros of $f(x) = x^2 - 1$

$y = f(x) = x^2 - 1$

$0 = x^2 - 1$

$0 = (x+1)(x-1)$

$x+1 = 0$ or $x-1 = 0$

$x+1-1 = 0-1$

$x = -1$

$x-1+1 = 0+1$

$x = 1$

Zeros at $x = -1$ or $x = 1$

(14) graph

$f(x) = -2x^2 - 12x$

set $-2x^2 - 12x = 0$

$2x(-x - 6) = 0$

$2x = 0$ OR $-x - 6 = 0$

$\frac{2x}{2} = \frac{0}{2}$ OR $-x - 6 + 6 = 0 + 6$

$-x = 6$

$\frac{-x}{-1} = \frac{6}{-1}$

$x = 0$

x-intercepts

$x = -6$

(0, 0) and (-6, 0)

$f(x) = -2x^2 - 12x$

$a = -2,\ b = -12,\ c = 0$

$\text{Vertex} = \left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$

$\text{Vertex} = \left(\frac{-(-12)}{2(-2)}, f\left(\frac{-(-12)}{2(-2)}\right)\right)$

$\text{Vertex} = \left(\frac{12}{-4}, f\left(\frac{12}{-4}\right)\right)$

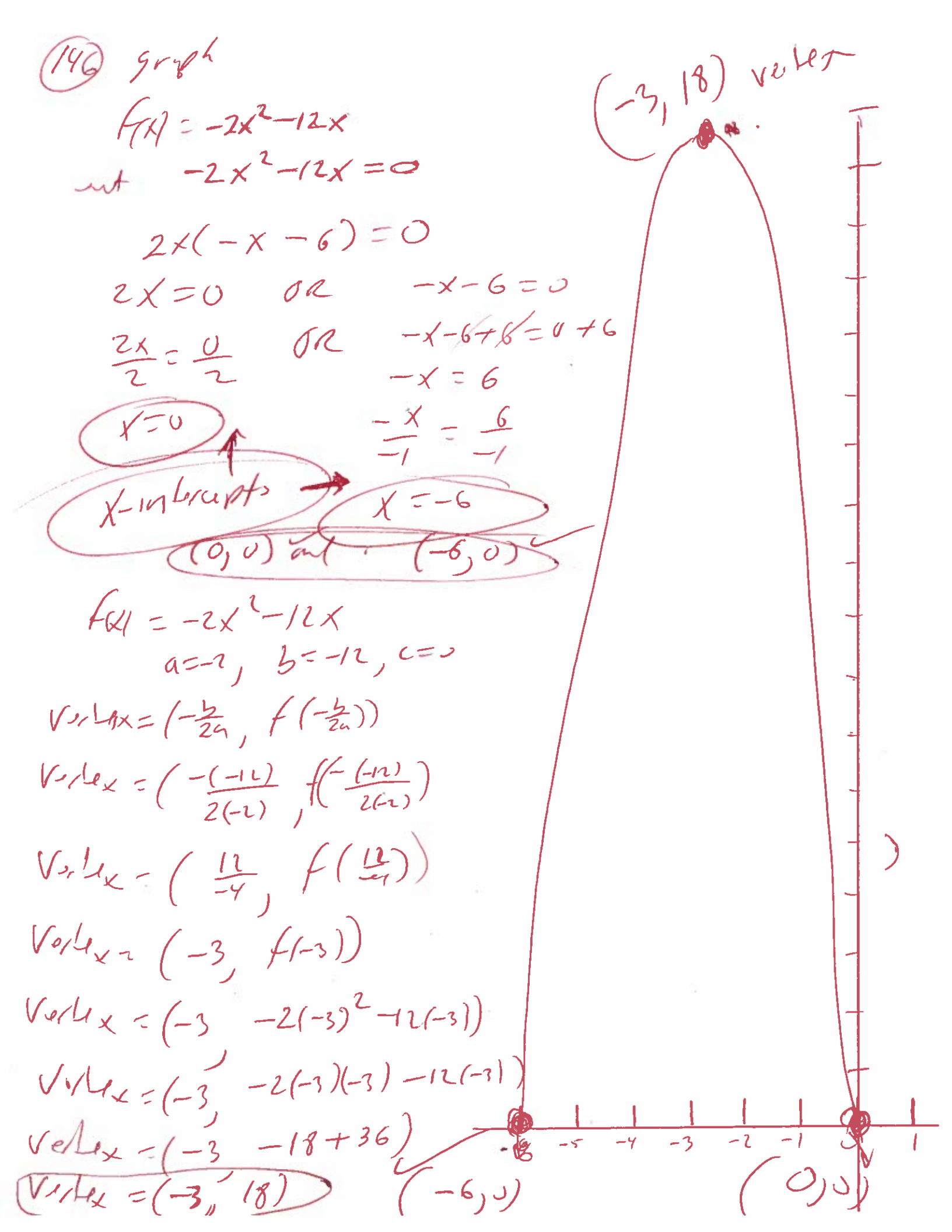
$\text{Vertex} = (-3, f(-3))$

$\text{Vertex} = (-3, -2(-3)^2 - 12(-3))$

$\text{Vertex} = (-3, -2(-3)(-3) - 12(-3))$

$\text{Vertex} = (-3, -18 + 36)$

$\text{Vertex} = (-3, 18)$



(142) graph

$f(x) = x^2 - 4x - 12$

$a = 1,\ b = -4,\ c = -12$

$\text{Vertex} = \left(\frac{-b}{2a},\ f\left(\frac{-b}{2a}\right)\right)$

$\text{Vertex} = \left(\frac{-(-4)}{2(1)},\ f\left(\frac{-(-4)}{2(1)}\right)\right)$

$\text{Vertex} = \left(\frac{4}{2},\ f\left(\frac{4}{2}\right)\right)$

$\text{Vertex} = (2,\ f(2))$

$\text{Vertex} = (2,\ (2)^2 - 4(2) - 12)$

$\text{Vertex} = (2,\ (2)(2) - 4(2) - 12)$

$\text{Vertex} = (2,\ 4 - 8 - 12)$

$\text{Vertex} = (2,\ -4 - 12)$

$\text{Vertex} = (2, -16)$

Find y-intercept let $x = 0$

$f(0) = (0)^2 - 4(0) - 12$

$f(0) = (0)(0) - 4(0) - 12$

$f(0) = 0 - 0 - 12$

$f(0) = -12$

y-intercept $(0, -12)$

Find x-intercept

$y = f(x) = x^2 - 4x - 12$ let $y = 0$

$0 = x^2 - 4x - 12$

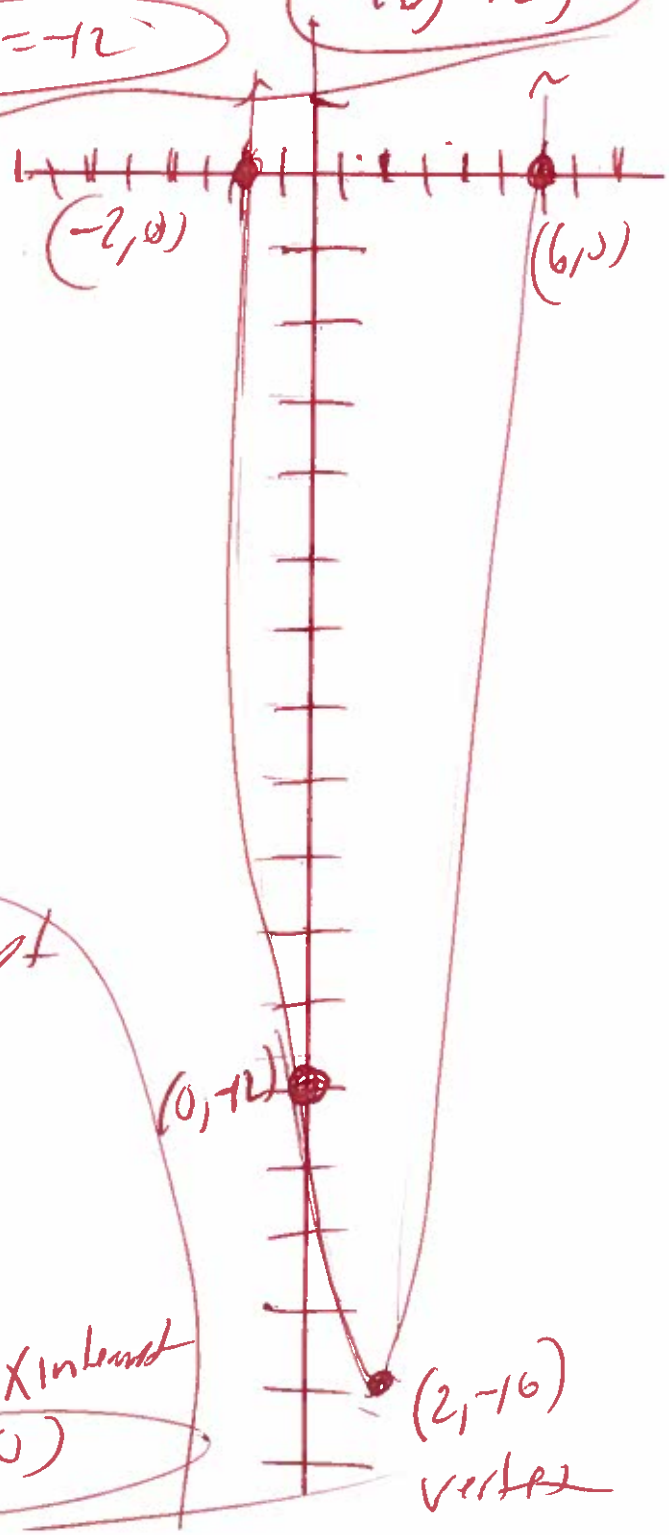
$0 = (x + 2)(x - 6)$

$x + 2 = 0$ OR $x - 6 = 0$

$x + 2 - 2 = 0 - 2$ OR $x - 6 + 6 = 0 + 6$

$x = -2$ OR $x = 6$ x-intercepts

$(-2, 0)$ and $(6, 0)$



(148) Graph

$y = 2^x$

$y = 2^{-1} = \frac{1}{2}$

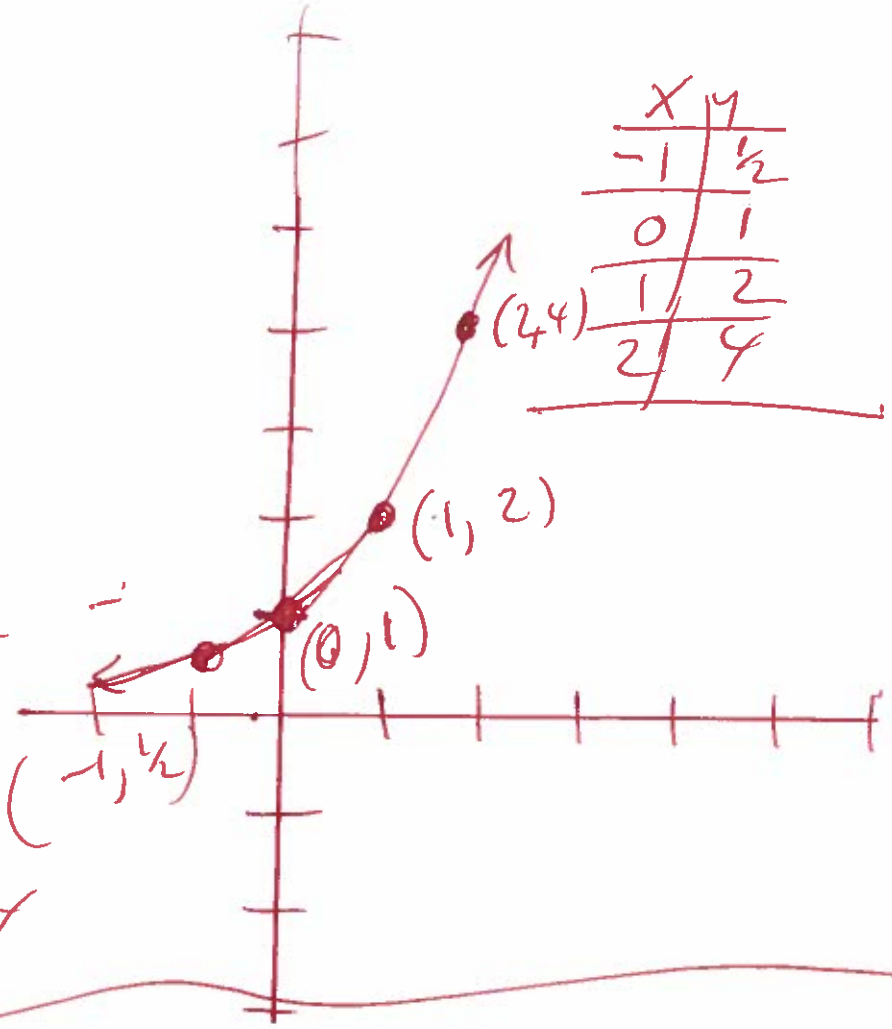
$y = 2^0$

$y = 1$

$y = 2^1 = 2$

$y = 2^2 = 2 \cdot 2 = 4$

x	y
-1	½
0	1
1	2
2	4



(149) Write the first five terms of each sequence whose general term is given.

$a_n = 5n + 4$

$a_1 = 5(1) + 4 = 5 + 4 = 9$

$a_2 = 5(2) + 4 = 10 + 4 = 14$

$a_3 = 5(3) + 4 = 15 + 4 = 19$

$a_4 = 5(4) + 4 = 20 + 4 = 24$

$a_5 = 5(5) + 4 = 25 + 4 = 29$