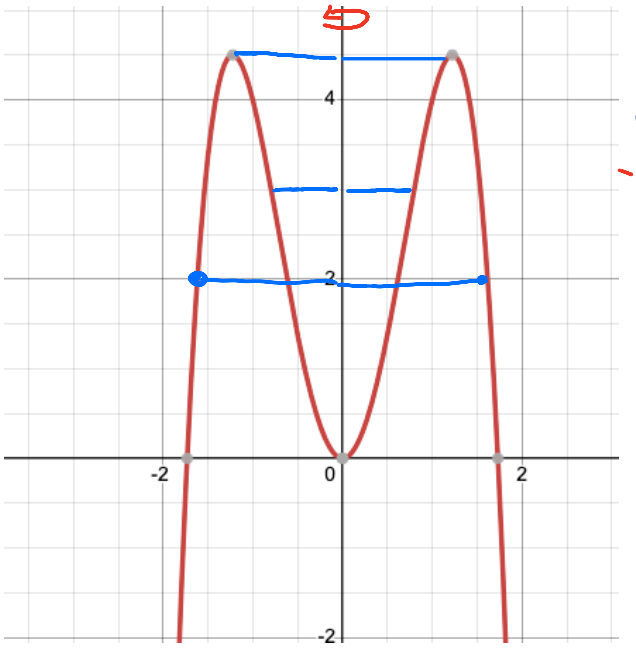
Period 4, Oct 1, 2024

even and odd functions

symmetry over the axis and origin



$$y = -2x^4 + 6x^2$$

- Symmetric over y-axis

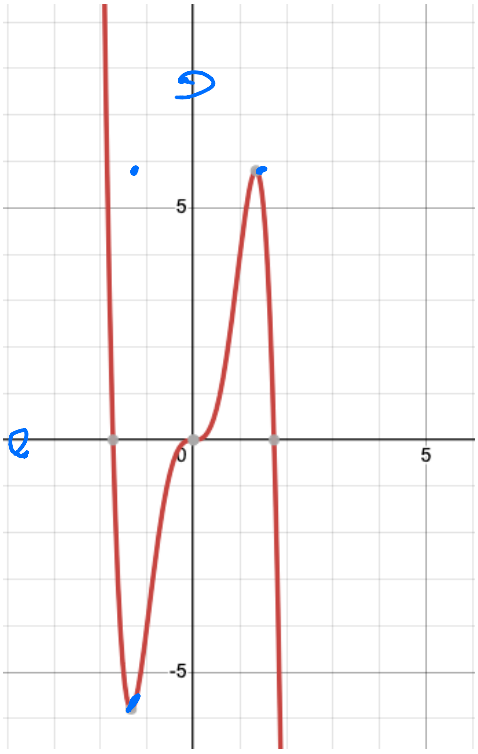
Even Function

$F(-x) = F(x)$

$F(-x) = -2(-x)^4 + 6(-x)^2$

$F(-x) = -2x^4 + 6x^2$

$F(x) = -2x^4 + 6x^2$ } Even



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

Even, odd, none

Even

$F(-x) = F(x)$

$F(x) = -2x^5 + 6x^3$

$F(-x) = -2(-x)^5 + 6(-x)^3$ — not the same

$F(-x) = 2x^5 - 6x^3$

NOT even

odd

$F(-x) = -F(x)$

$2x^5 - 6x^3 = -(-2x^5 + 6x^3)$

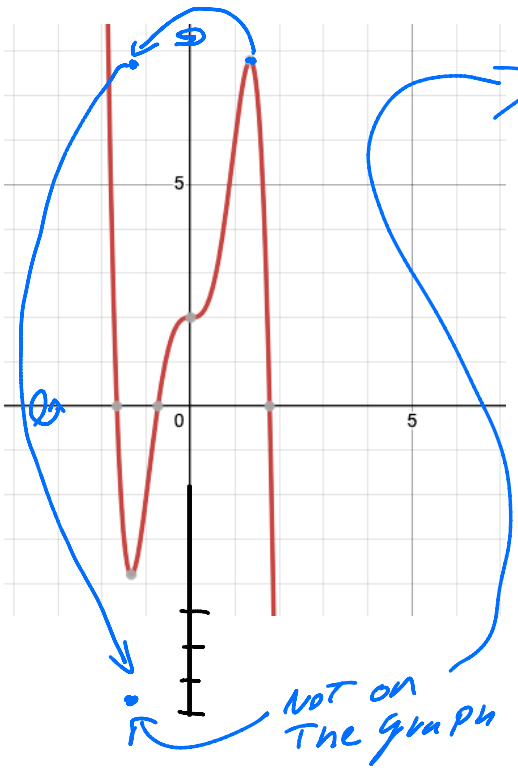
$2x^5 - 6x^3 = 2x^5 - 6x^3$

same

odd Function

Symmetric over origin

over both x and y axis



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

NOT Even or odd

NOT on The Graph

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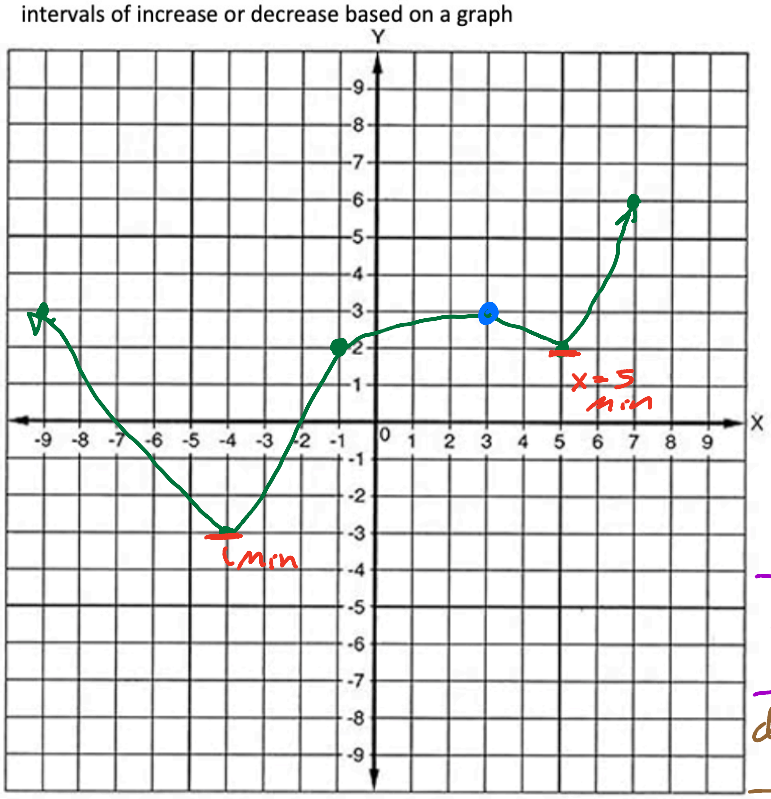
intervals of increase or decrease based on a graph



Relative Max

$x=3$

From increase to decrease

Relative Min

$x=-4$

$x=5$

decreasing To increase

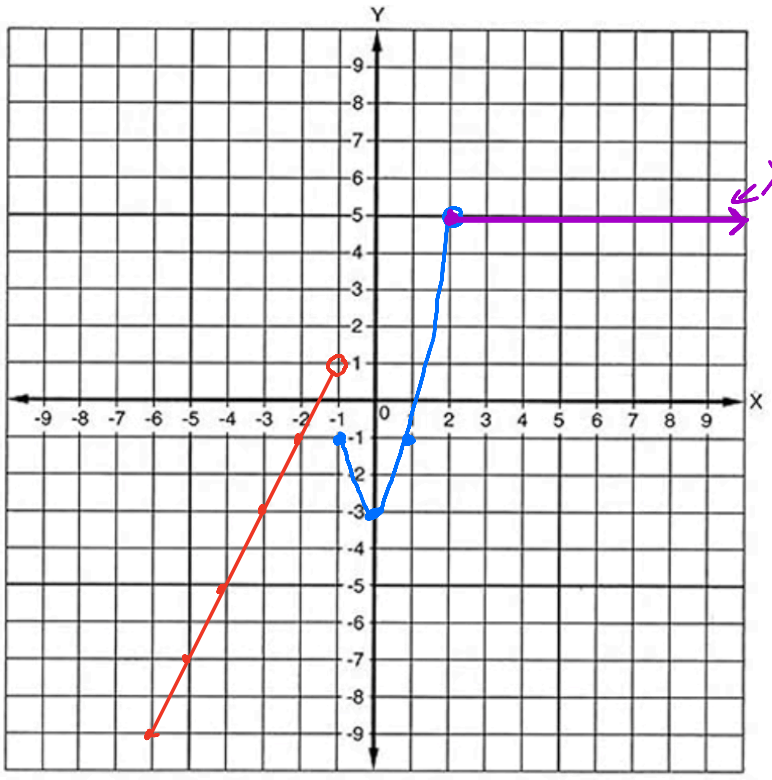
increase $5<x<7$

$-4<x<3$

decrease $-9<x<-4$

$3<x<5$

piece wise function



$$F(x) = \begin{cases} 2x+3 & x < -1 \\ 2x^2-3 & -1 \le x < 2 \\ 5 & x \ge 2 \end{cases}$$

x	$y = 2x^2-3$
-1	$2(-1)^2-3 = 2-3 = -1$
0	$2(0)^2-3 = 0-3 = -3$
1	$2(1)^2-3 = 2-3 = -1$
2	$2(2)^2-3 = 8-3 = 5$

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use f(x+h)

$$F(x) = 2x^3 - 4x^2 + 2x + 3$$

$$F(x+h) = 2(x+h)^3 - 4(x+h)^2 + 2(x+h) + 3$$

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

$$F(x+h) = 2(x^3+3x^2h+3xh^2+h^3) - 4(x^2+2xh+h^2) + 2(x+h) + 3$$

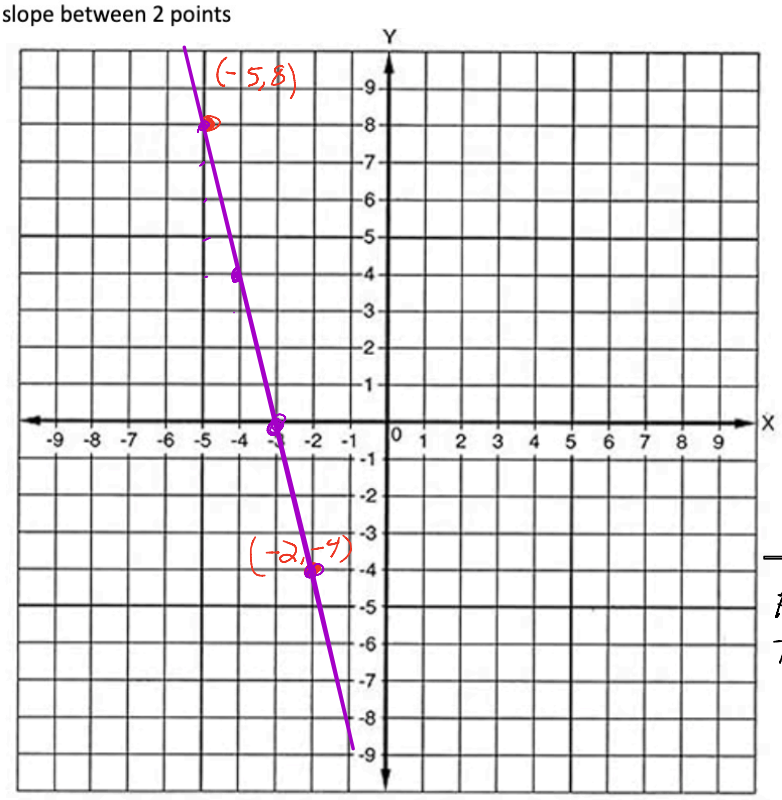
$$F(x+h) = 2x^3+6x^2h+6xh^2+2h^3 - 4x^2-8xh-4h^2+2x+2h+3$$

$$\frac{F(x+h)-F(x)}{h}$$

$$\frac{2x^3+6x^2h+6xh^2+2h^3-4x^2-8xh-4h^2+2x+2h+3 - [2x^3-4x^2+2x+3]}{h}$$

$$\frac{h(6x^2+6xh+2h^2-8x-4h+2)}{h} = 6x^2+6xh+2h^2-8x-4h+2$$

slope between 2 points



Slope between (-5,8) and (-2,-4)
x_1, y_1 x_2, y_2

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{Rise}}{\text{Run}} = \text{Slope}$$

$$m = \frac{-4-8}{-2-(-5)} = \frac{-12}{-2+5} = \frac{-12}{3} = \frac{-4}{1}$$

$$m = \frac{-4}{1} = \frac{\text{Rise}}{\text{Run (Right)}}$$

Find The equation For The Line Formed by (-5,8) and (-2,-4)

$m = -4$ Point $(-5,8)$ x_1, y_1

Point Slope

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

$y - 8 = -4(x + 5)$

$y - 8 = -4(x+5) \Rightarrow$ Solve For y $\Rightarrow y - 8 = -4x - 20$

$+8 \quad +8$

$y = -4x - 12$

or

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

$y + 4 = -4(x+2) \Rightarrow$ Solve For y

$y + 4 = -4x - 8$

$-4 \quad -4$

$y = -4x - 12$

Slope intercept Form

$y = mx + b$

Create a Slope intercept Form of The Line containing $y = mx + b$

(-5,8) (-2,-4) Step 1 $y = -4x + b$ (Slope ↓, Point ↓)

$m = -4$

Step 2 $8 = -4(-5) + b \Rightarrow 8 = 20 + b \Rightarrow -12 = b \Rightarrow y = -4x - 12$

$-20 \quad -20$

To Find an Equation For a Line we need The Slope and one point

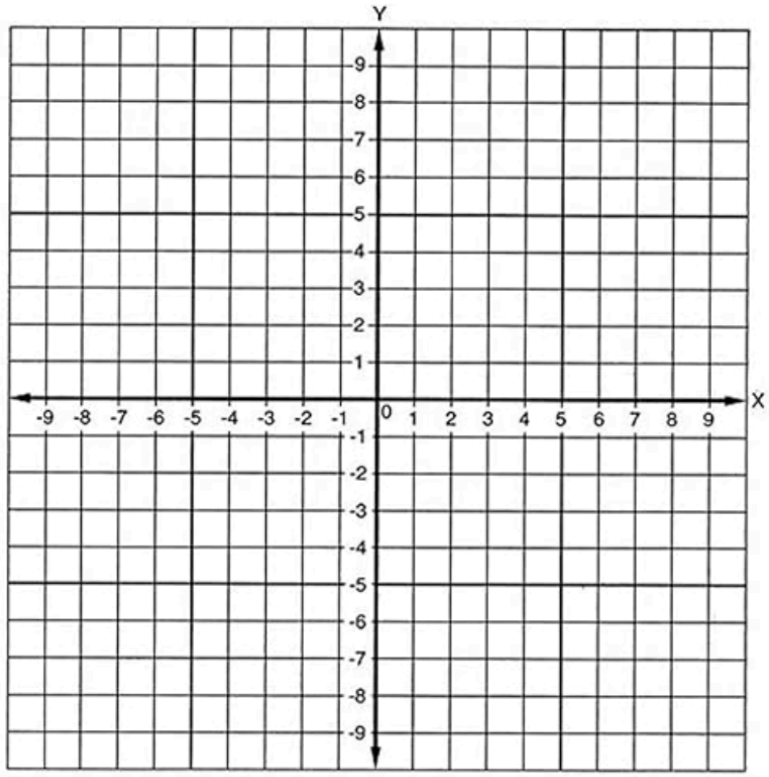
$F(x) = \sqrt{x+2}$ $\quad F(x+h) = \sqrt{x+h+2}$

$$\frac{F(x+h)-F(x)}{h} = \frac{\left(\sqrt{x+h+2}-\sqrt{x+2}\right)}{h}\cdot\frac{\left(\sqrt{x+h+2}+\sqrt{x+2}\right)}{\left(\sqrt{x+h+2}+\sqrt{x+2}\right)}$$

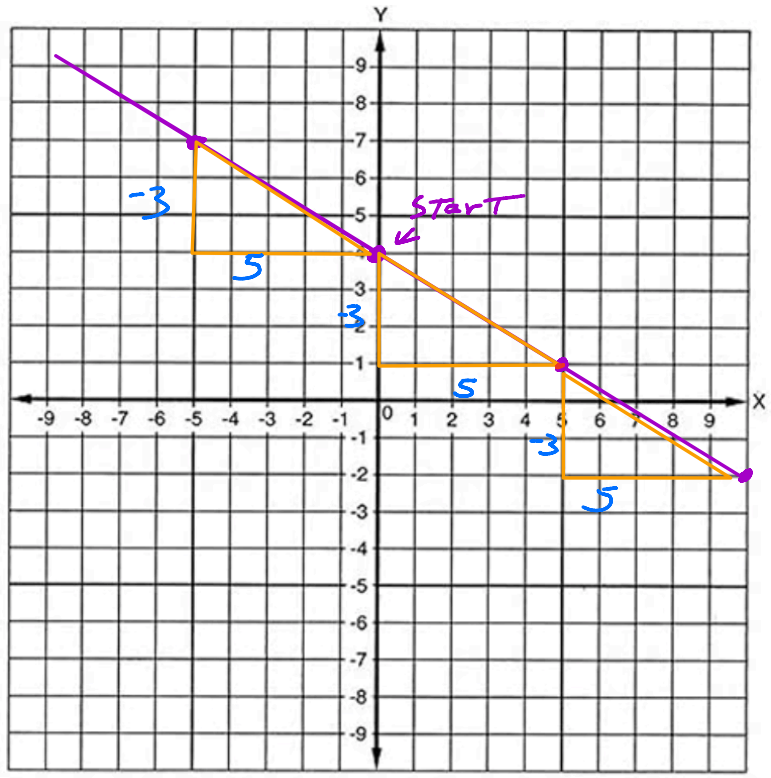
$$\frac{x+h+2+\sqrt{x+h+2}\sqrt{x+2}-\sqrt{x+h+2}\sqrt{x+2}-(x+2)}{h\left(\sqrt{x+h+2}+\sqrt{x+2}\right)} = \frac{x+h+2-x-2}{h\left(\sqrt{x+h+2}+\sqrt{x+2}\right)} = \frac{h}{h\left(\sqrt{x+h+2}+\sqrt{x+2}\right)}$$

$$\frac{1}{\sqrt{x+h+2}+\sqrt{x+2}}$$

create point slope and slope intercept with just 2 points



graph a line using point slope or slope intercept functions



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

Slope $= m = -\frac{3}{5} = \frac{\text{Rise}}{\text{Run}} =$ The path

Y-intercept $= 4$

$(0, 4)$

Point Slope Form

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

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

Point $(5, 1)$

x_1, y_1

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

$y - 1 = -\frac{3}{5}x + \frac{15}{5}$

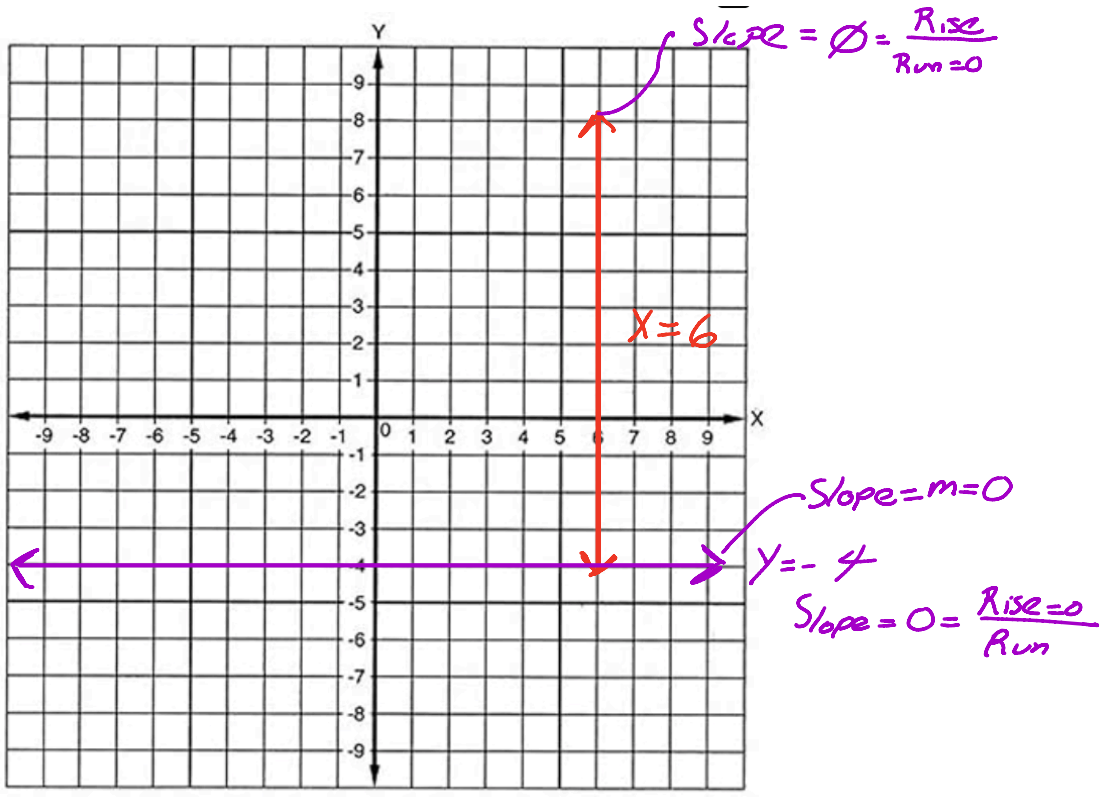
$y + 1 = -\frac{3}{5}x + 3$

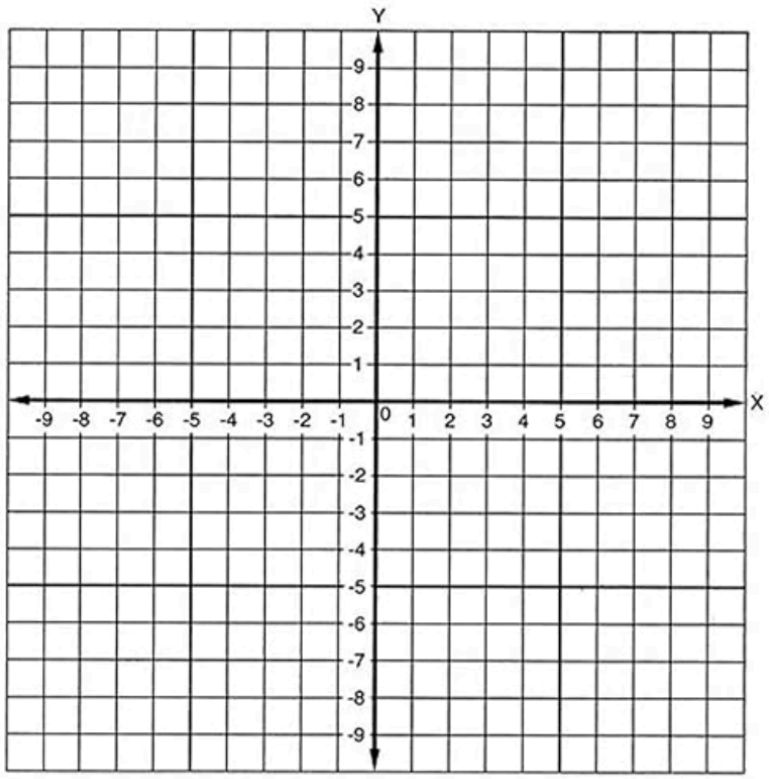
$+1 \quad +1$

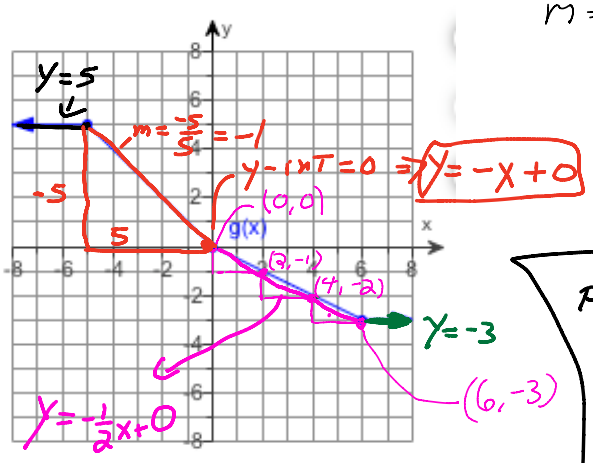
$y = -\frac{3}{5}x + 4$

intercept of the origin looks like.

vertical and horizontal lines.




Y
X
9
8
7
6
5
4
3
2
1
-9 -8 -7 -6 -5 -4 -3 -2 -1
0 1 2 3 4 5 6 7 8 9
-1
-2
-3
-4
-5
-6
-7
-8
-9



$m = \frac{y_2 - y_1}{x_2 - x_1} = \text{Slope} = \frac{\text{Rise}}{\text{Run}}$

$(0,0)$ $(6,-3)$ $\quad m = \frac{-3-0}{6-0} = \frac{-3}{6} = -\frac{1}{2}$

Down 1 over (Right) 2

Piecewise Function

$$F(x) = \begin{cases} 5 & x \le -5 \\ -x+0 & -5 < x \le 0 \\ -\frac{1}{2}x+0 & 0 < x < 6 \\ -3 & x \ge 6 \end{cases}$$

For what value of x is g(x) = −2? $x = 4$

Solve Ax + By = C for y.

$Ax + By = C$

$-Ax \qquad -Ax$

$\frac{By}{B} = \frac{C-Ax}{B}$

$y = \frac{C-Ax}{B} \Rightarrow \frac{C}{B} - \frac{Ax}{B}$

Solve the equation.

$$\frac{x+4}{2} = 1 - \frac{x+4}{5}$$

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

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

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

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

$\frac{10}{1} \cdot \frac{(x+4)}{2} = \frac{(1-x)}{5} \cdot \frac{10}{1}$

$\frac{5 \cdot 2 \cdot (x+4)}{2} = \frac{5 \cdot 2(1-x)}{5}$

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

$2 - 2x = 5x + 20$

$-20 + 2x \quad +2x \quad -20$

$\frac{-18}{7} = \frac{7x}{7} \Rightarrow \frac{-18}{7} = x$

Extra homework due Tuesday oct 8

1) $F(x) = 7x^3 + 2x - 4$

$F(x+h) = ?$

a) $F(x) = 5(x)^4 + 3x^3 - 1$

$F(x+h) = ?$

3) $F(x) = 5x^2 - 2x + 4$

$F(x+h)$

4) $F(x) = 6x^2 + 2x - 3$

$\frac{F(x+h) - F(x)}{h} =$

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

$\frac{F(x+h) - F(x)}{h} =$