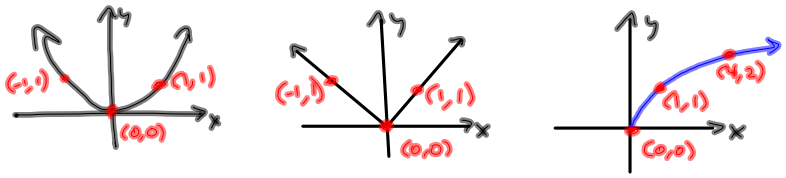
Homework Solutions are Posted.

$f(x) = x^2$ $f(x) = |x|$ $f(x) = \sqrt{x}$



Homework: 48 pts + 4 Bonus possible

$A = P(1+\frac{r}{n})^{nt}$ Learn how to implement this.

TI-30 IIS is a nice 1-step calculator.

6. $\varnothing$ 7. $\varnothing$ 8. $(-\infty, \infty)$

$|9x+7| = |3x-1|$

$9x+7 = 3x-1$ OR $9x+7 = -(3x-1)$ The Key

$6x = -8$ OR $9x+7 = -3x+1$

$x = -\frac{8}{6} = -\frac{4}{3}$ OR $12x = -6$

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

$x \in \{-\frac{4}{3}, -\frac{1}{2}\}$

Some are writing this: $\{x \mid x = -\frac{4}{3} \text{ OR } x = -\frac{1}{2}\}$ which is fine, but when the solution set only has 2 numbers, total, just listing them is easier. $x \in \{-\frac{4}{3}, -\frac{1}{2}\}$

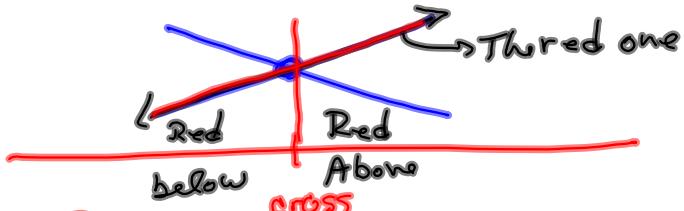
Mega-Bonus is taking THIS and applying it to $|9x+7| > |3x-1|$.

This breaks up $\mathbb{R}$ into 3 pieces.

$(-\infty, -\frac{4}{3})$ $-\frac{4}{3}$ $(-\frac{4}{3}, -\frac{1}{2})$ $-\frac{1}{2}$ $(-\frac{1}{2}, \infty)$

$x = -\frac{4}{3}$ & $x = -\frac{1}{2}$ is where they cross.

at these crossings, the switch who's on top



Analyze above & Below:

	Test	$\lvert 9x+7\rvert$? $\lvert 3x-1\rvert$	
$(-\infty, -\frac{4}{3})$	$x=-2$	$11 > 7$	Yes.
$(-\frac{4}{3}, -\frac{1}{2})$	$x=-1$	$2 < 4$	No
$(-\frac{1}{2}, \infty)$	$x=0$	$7 > 1$	Yes

Scratch:

$|9(-2)+7| = |-18+7| \neq |-11| = 11$

$|3(-2)-1| = |-6-1| = |-7| = 7$

$|9(-1)+7| = |-2| = 2$

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

$|7| = 7$

$|-1| = 1$

Answer: $(-\infty, -\frac{4}{3}) \cup (-\frac{1}{2}, \infty)$

Fixes Teacher's Flatulence week 1.

Quiz on Tuesday, Based on Home 02
It may have something from Home 01.

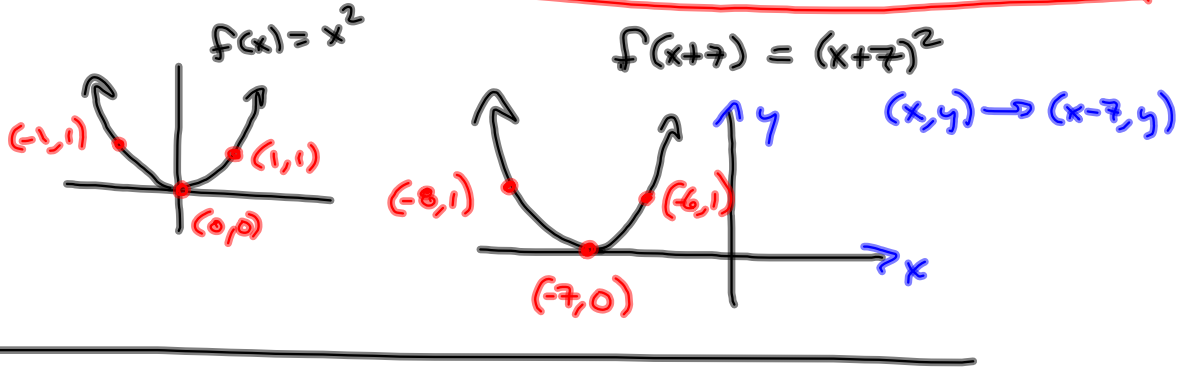
The x^2, $|x|$, & $\sqrt{x}$ talk is from §3.6

Horizontal Shift: $f(x+7)$ Left 7 Advance

Horizontals are "opposite" of your intuition. $(x, y) \longrightarrow (x-7, y)$

$f(x-5)$ Right 5 Delay

$(x, y) \longrightarrow (x+5, y)$



$f(x) + 7$ Vertical shift

up 7

$(x, y) \longrightarrow (x, y+7)$

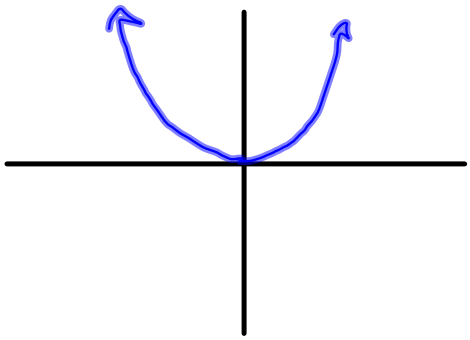
These are intuitive. Just what you'd hope.

$f(x) - 5$

down 5

$(x, y) \longrightarrow (x, y-5)$

$g(x) = (x+3)^2 - 11$



$f(x) = x^2$ and $g(x) = f(x+3) - 11$

Writing $g(x)$ in terms of the basic functions.

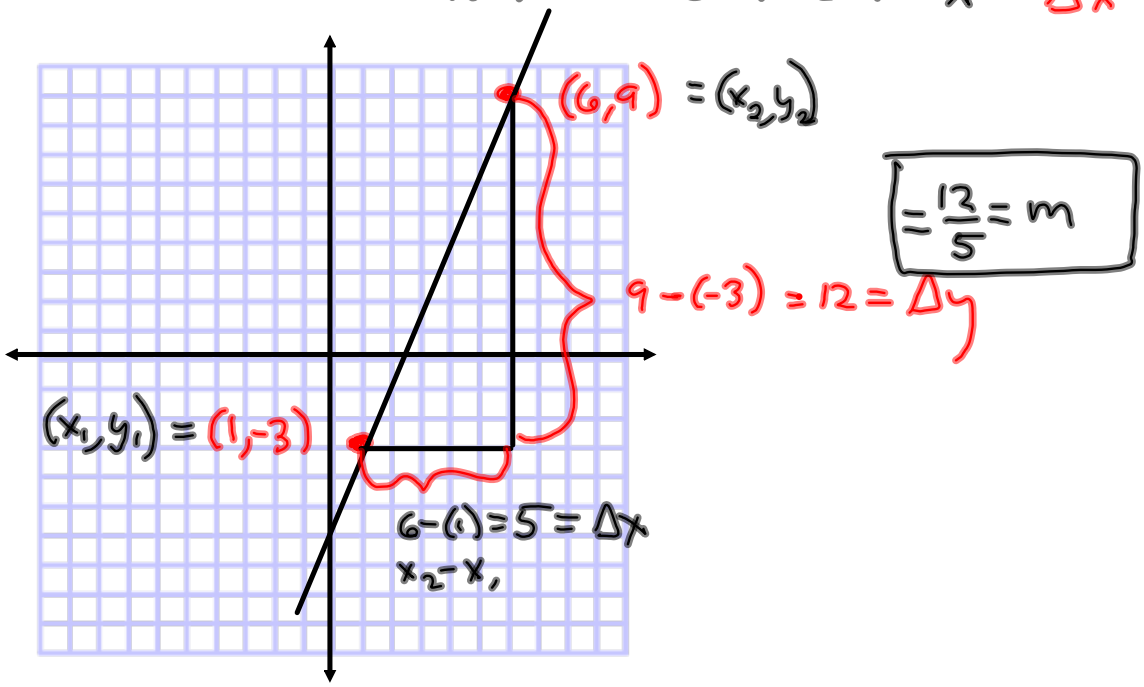
$f(x+3) - 11$

left 3 down 11

Step Back to §3.4

Slope of the Line Between Two Points.

$$m = \text{Slope} = \frac{\text{Rise}}{\text{Run}} = \frac{\text{Change in } Y}{\text{Change in } X} = \frac{\Delta y}{\Delta x}$$

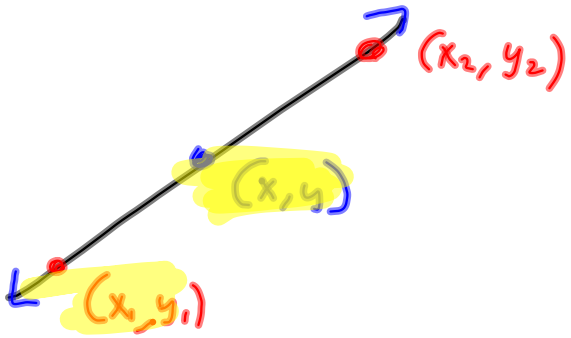


Equation of the Line – Jumped the Gun

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

Equation of the Line with slope

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



Let (x,y) be another point on the line.

Then the slope between it and (x_1, y_1) is

$$m = \frac{y - y_1}{x - x_1} = m$$

Clear fractions

$$\left(\frac{y - y_1}{x - x_1}\right)(x - x_1) = m(x - x_1)$$

$y - y_1 = m(x - x_1)$ is POINT-SLOPE FORM.

Given a point on the line $\mathcal{L}$, and the slope, we can write the equation of $\mathcal{L}$ in ONE STEP.

Recall $(1,-3), (6,9)$ $(x_1,y_1), (x_2,y_2)$ we found $m = \frac{12}{5}$.

This and $(x_1,y_1) = (1,-3)$ gives

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

$y - (-3) = \frac{12}{5}(x-1)$

$y + 3 = \frac{12}{5}x - \frac{12}{5}$

$-3 = \quad -3$

$y = \frac{12}{5}x - \frac{27}{5}$

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

POINT-SLOPE

Scratch

$-\frac{12}{5} - \frac{3}{1}\cdot\frac{5}{5}$

$= -\frac{12}{5} - \frac{15}{5} = -\frac{27}{5}$

$y = mx + b$

Slope-Intercept.

$f(x) = \frac{12}{5}x - \frac{27}{5}$

As Linear Function

Pulled a hammy.

$5y = 12x - 27$

$-12x + 5y = -27$

$12x - 5y = 27$ Standard Form

$Ax + By = C.$

$(1,-3), (6,9)$

The lame, $y=mx+b$ way:

$$m = \frac{y_2-y_1}{x_2-x_1} = \frac{9-(-3)}{6-1} = \frac{12}{5}$$

$$y = mx+b$$

$$-3 = \frac{12}{5}(1)+b$$

$$-\frac{3}{1}\cdot\frac{5}{5} = \frac{12}{5} + \frac{b}{1}\cdot\frac{5}{5}$$

Ugh. Algebra.

$$\frac{-15}{5} = \frac{12}{5} + \frac{5b}{5} = \frac{12+5b}{5}$$

$$-\frac{15}{5} = \frac{12+5b}{5}$$

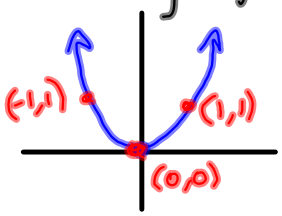
$$-15 = 12+5b$$

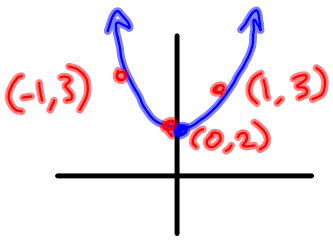
$$-12 = -12$$

$$-27 = 5b$$

$$-\frac{27}{5} = b, \text{ so, } \boxed{y = \frac{12}{5}x - \frac{27}{5}}$$

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





$f(x) = x^2$

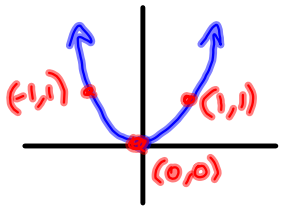
$f(x) + 2 = x^2 + 2 = g(x)$

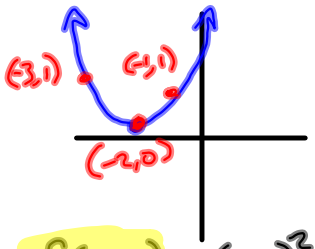
up 2

(-1,1) • • (1,1)

• (0,0)

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





$f(x) = x^2$

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

Left 2

Piecewise-Defined functions:

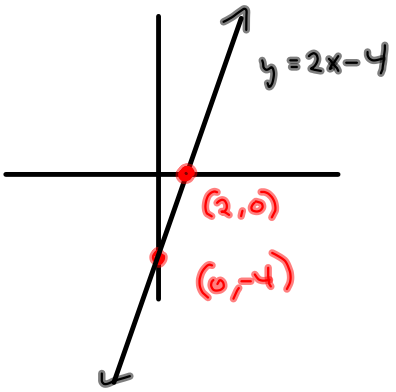
Graph each piece
Find endpoints & suture points

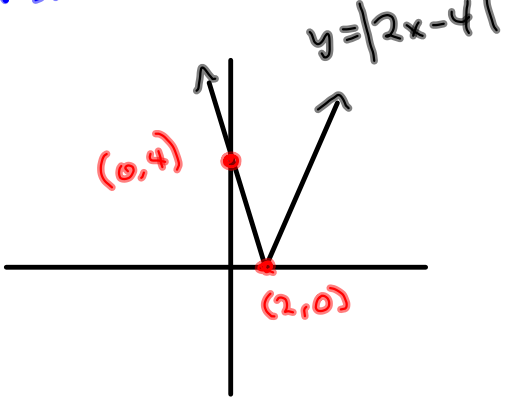
Graph $f(x) = |2x-4| = \begin{cases} 2x-4 & \text{if } 2x-4 \geq 0 \\ -(2x-4) & \text{if } 2x-4 < 0 \end{cases}$

scratch $2x-4 \geq 0$
$2x \geq 4$
$x \geq 2$

$= \begin{cases} 2x-4 & \text{if } x \geq 2 \\ -2x+4 & \text{if } x < 2 \end{cases}$

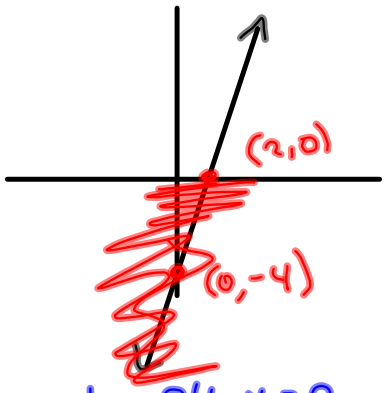
By previous Discussion: Graph $2x-4$ & reflect the part below the x-axis.





$$f(x) = |2x-4| = \begin{cases} 2x-4 & \text{if } x \geq 2 \\ -2x+4 & \text{if } x < 2 \end{cases}$$

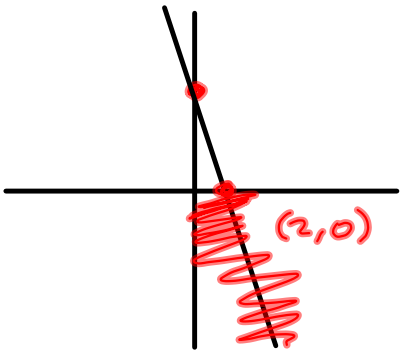
$y = 2x-4$



Suture Pt: $x = 2$

Solid Dot: • $x \geq 2$

$y = -2x+4$



$-2x+4 = 0$

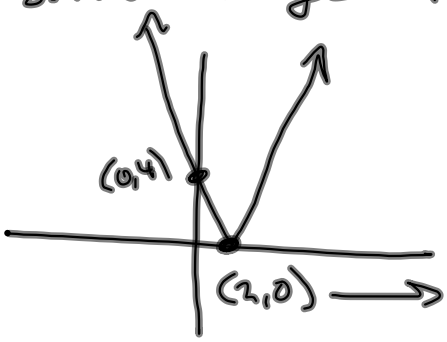
$-2x = -4$

$x = 2$

Suture Pt: $x = 2$

Open Dot: ○ $x < 2$

Stitch together:



→ Nice that they meet!

Next time!

$$f(x) = \begin{cases} x^2+2 & \text{if } x < 2 \\ 3x-6 & \text{if } x \geq 2 \end{cases}$$