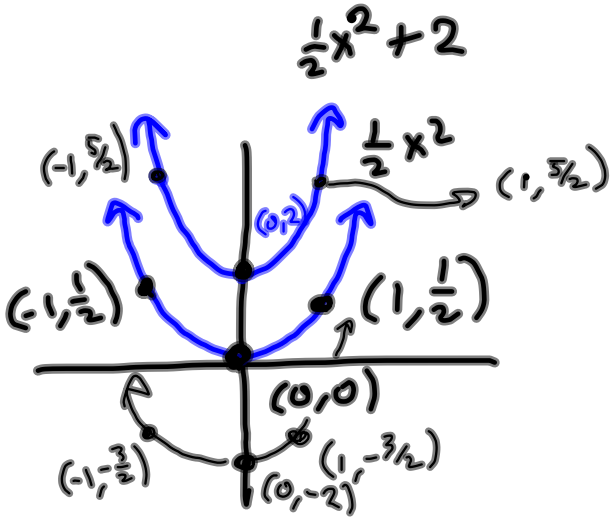
§3.1 #s 13-33

#s 13-16 Graph on same coordinate axes

(15) $y = \frac{1}{2}x^2$ is an x^2, but half as tall

$$\frac{1}{2}x^2 + 2 = \frac{x^2}{2} + 2$$



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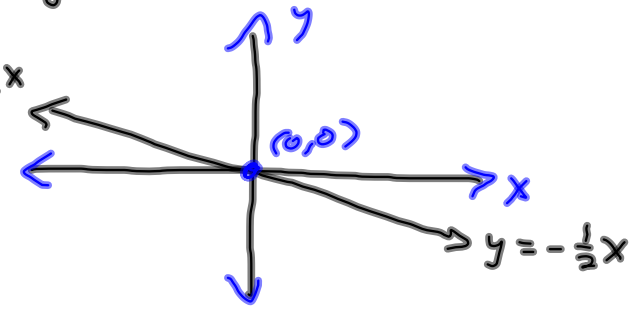
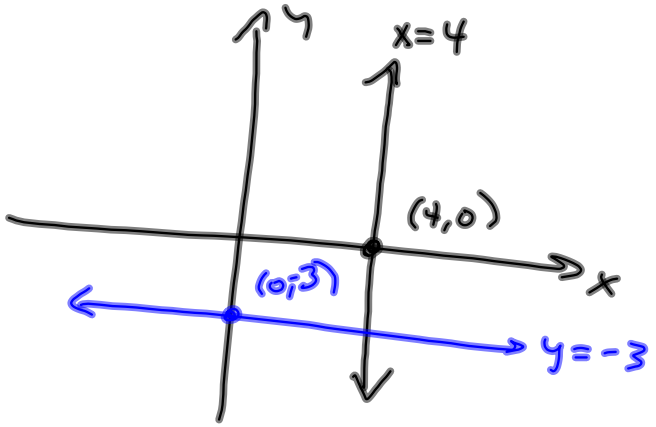
(21) graph the lines.

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



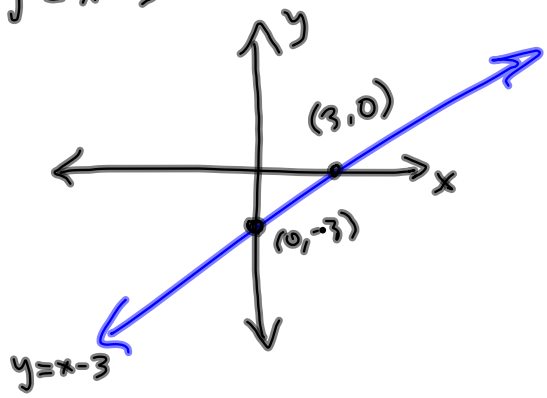
$x = 4$



#31 See notes

33 $y = x - 3$

x	y
0	-3
3	0



$y = x - 3 = 0$

$x = 3$

$(3, 0)$

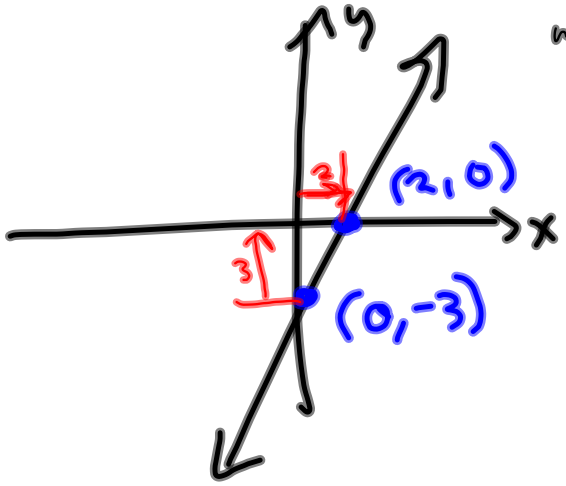
§3.2

#51-c Find slope from graph

$(x_1, y_1) = (2, 0)$

$(x_2, y_2) = (0, -3)$

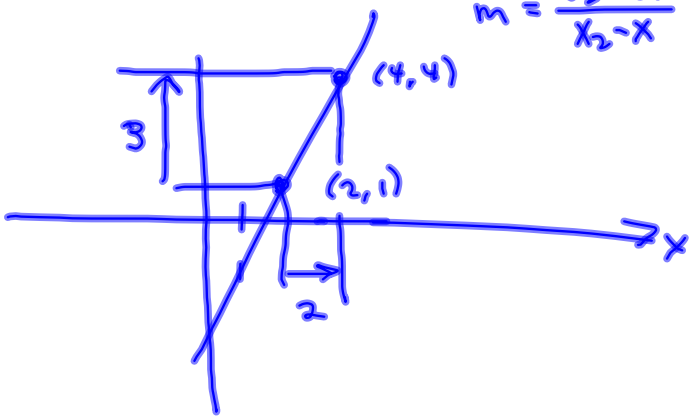
$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 - 0}{0 - 2} = \frac{-3}{-2} = \frac{3}{2} = m$



#7-20 Find Slope. Sketch line. Indicate rise & run.

(7) $(2,1)$, $(4,4)$
(x_1, y_1), (x_2, y_2)

$$m = \frac{y_2 - y_1}{x_2 - x} = \frac{4-1}{4-2} = \frac{3}{2} = m$$



(17) $(-4,6)$ & $(2,6)$ $\quad y = 6$ Horizontal

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6-6}{2-(-4)} = \frac{0}{6} = 0$$ zero slope

(17*) $(6,-4)$ & $(6,2)$ $\quad x = 6$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-(-4)}{6-6} = \frac{6}{0}$$ ⊘

"No Slope"
Slope does not exist

§3.3 #s 1-6 Give eq'n of the line with following slope & y-int.

① $m = -4,\ b = -3$ $\quad y = mx + b$ Slope-Intercept

$y = -4x - 3$

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

we are given $m = -4$ & $(0, b) = (0, -3)$

$y = -4(x - 0) - 3$ Point-slope.

$= -4x - 3$

#s 7-12 Find slope of a line (a) parallel & (b) perpendicular to the given line.

⑦ $y = 3x - 2 \Longrightarrow \boxed{m_{\parallel} = 3}$ (a)

$\Longrightarrow m_{\perp} = -\frac{1}{3}$ (b)

⑪ $2x + 5y = -11$

$5y = -2x - 11$

$y = \frac{-2x}{5} - \frac{11}{5}$

(a) $m = -\frac{2}{5} \Longrightarrow$ (b) $m_{\perp} = \frac{5}{2}$

#s 23-32 Eq'n of line thru the point with the given slope.

(25) $(-4, 1)$; $m = -\frac{1}{2}$

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

S-I $y = mx + b$

Stdcl $Ax + By = C$

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

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

$y = -\frac{1}{2}(x - (-4)) + 1$ Stop!

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

$y = -\frac{1}{2}x - 1$ is slope-intercept form.

$\left(\frac{1}{2}x + y = -1\right)$ TIMES LCD

$x + 2y = -2$ is standard form.

only do these forms if specifically asked.

Find Eq'n of line thru ...

#33 $(3,-2)$ & $(-2,1)$

(x_1, y_1) (x_2, y_2)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1-(-2)}{-2-3} = \frac{3}{-5}$$

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

$$y = -\frac{3}{5}(x-3) - 2 \quad \text{Stop!}$$

... in standard form:

$$= -\frac{3}{5}x + \frac{9}{5} - \frac{2}{1}\cdot\frac{5}{5} =$$

$$= -\frac{3}{5}x + \frac{9-10}{5}$$

$$y = -\frac{3}{5}x - \frac{1}{5} \quad \text{Slope-Intercept}$$

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

$$\boxed{3x + 5y = -1} \quad \text{standard}$$

$-\frac{3}{5}x$

$$\left(-\frac{3}{5}\right)(3)$$

$$= \left(-\frac{3}{5}\right)\left(\frac{3}{1}\right) = +\frac{9}{5}$$

Times 5

$$5y = -3(x-3) - 10$$

$$5y = -3x + 9 - 10$$

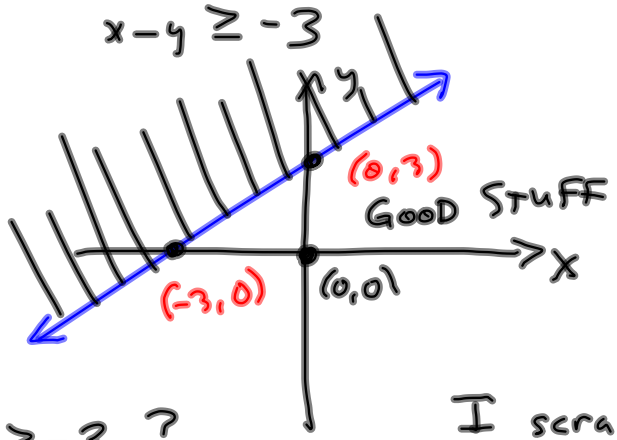
$$5y = -3x - 1$$

§3.4 Graph the solution set.

#3 $x - y \geq -3$

Inevon

x	y
0	3
-3	0



Test! (0,0)

$0 - 0 \geq -3$?

$0 \geq -3$

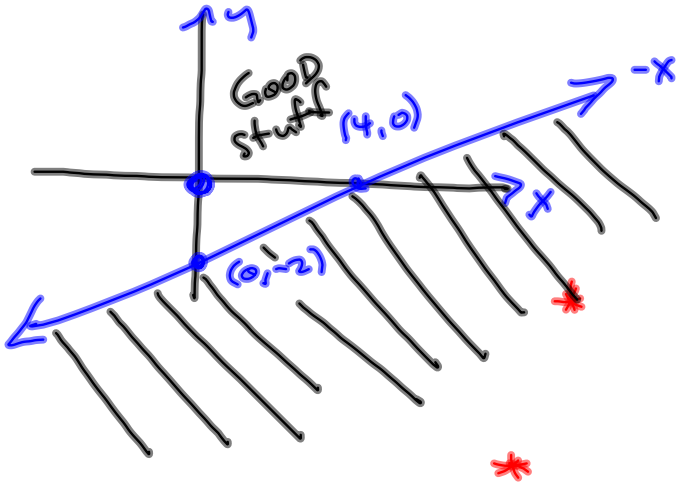
I scratch out the bad stuff.

#7 $-x + 2y > -4$

x	y
6	-2
4	0

$2y = -4 \quad y = -2$

$-x = -4 \quad x = 4$



Test: (0,0)

$-0 + 2(0) > -4$?

$0 > -4$?

Yes.

3.6 #53, 11

$f(x) = 2x - 5$, $g(x) = x^2 + 3x + 4$ ⟹

(11) $f(a+6) = 2(a+6) - 5$ most of points.

$= 2a + 12 - 5$

$= 2a + 7$

$f = \{(0,1), (2,3), (-1,5), (7,2)\}$

$g = \{(1,7), (2,5), (5,6), (2,11)\}$ Jessica

↳ g ain't a function.

But g ain't a func.

$f(-1) = 5$

$(g \circ f)(-1) = 6$

$g(f(-1)) = g(5) = 6$

$(g \circ f)(7) = g(f(7)) = g(2) =$ whoops!

g(2) is NOT well-defined

5? 11?

S3.7

(11) I varies inversely with the cube of w.

$$I = \frac{K}{w^3}$$

I = 32 when $w = \frac{1}{2}$

Find I when $w = \frac{1}{3}$.

$$32 = \frac{K}{\left(\frac{1}{2}\right)^3} = \frac{K}{\frac{1}{8}} = (K)\left(\frac{8}{1}\right) = 8K$$

$8K = 32$

$$K = \frac{32}{8} = 4 = K \Rightarrow$$

$$I = \frac{4}{w^3} \rightarrow$$

$$I\Big|_{w=\frac{1}{3}} = \frac{4}{\left(\frac{1}{3}\right)^3} = \frac{4}{\frac{1}{27}} = 4\left(\frac{27}{1}\right) = 108 = I$$

"I, when $w = \frac{1}{3}$"

$y = 2x - 3$

$y\Big|_{x=5} = 2(5) - 3 = 7$

§3.8 #40

$f(x) = -x+3$, $g(x) = x^3 - 1$

(a) $(f \circ g)(0) = f(g(0)) = f(0^3 - 1) = f(-1)$

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

(b) $(g \circ f)(0) = g(f(0)) = g(3) = (3)^3 - 1$

$= 27 - 1 = 26$

(c) $(f \circ g)(x) = f(g(x)) = f(x^3 - 1)$

$= -(x^3 - 1) - 3 = -x^3 + 1 - 3$

$= -x^3 - 2$

(d) $(g \circ f)(x) = g(f(x)) = g(-x+3)$

$= (-x+3)^3 - 1$

1 1 1 1 2 1 1 3 3 1

$(-x)^3 + 3(-x)^2(3) + 3(-x)(3)^2 + 3^3 - 1$

$= -x^3 + 9x^2 - 27x + 27 - 1$

$= -x^3 + 9x^2 - 27x + 26$

Bobby found a mistake on the $9x^2$ on the posted solutions

#43 & 44 are lead-in to inverse functions.

(43) Show that $f(x) = 5x - 4$ & $g(x) = \frac{x+4}{5}$ satisfy $(f \circ g)(x) = x$ & $(g \circ f)(x) = x$

I.O.W. $g(x) = f^{-1}(x)$

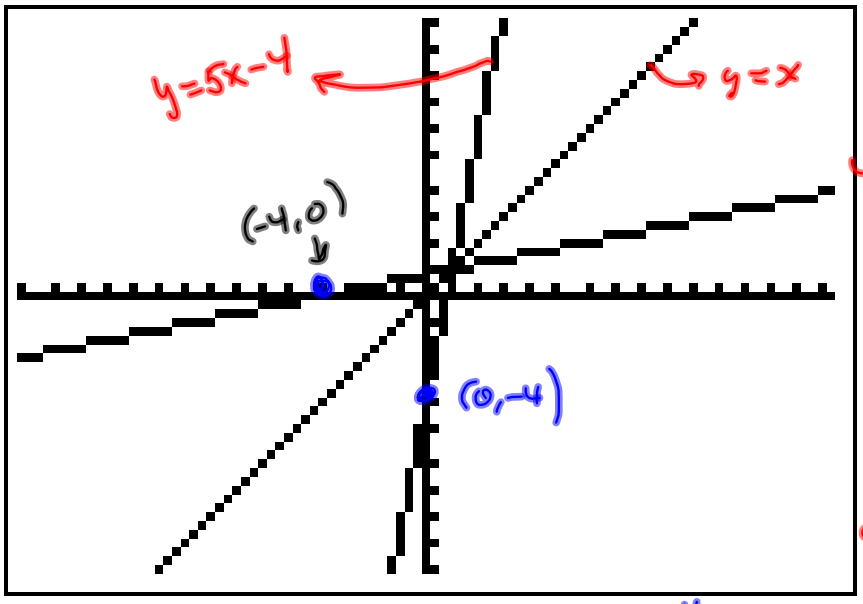
↳ f-inverse of x.

Not $\frac{1}{f(x)}$

$f(g(x)) = f\left(\frac{x+4}{5}\right)$

$= 5\left(\frac{x+4}{5}\right) - 4 = x + 4 - 4 = x$

$g(f(x)) = g(5x-4) = \frac{(5x-4)+4}{5} = \frac{5x}{5} = x$



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

Slopes positive
All intersect
on $y=x$.

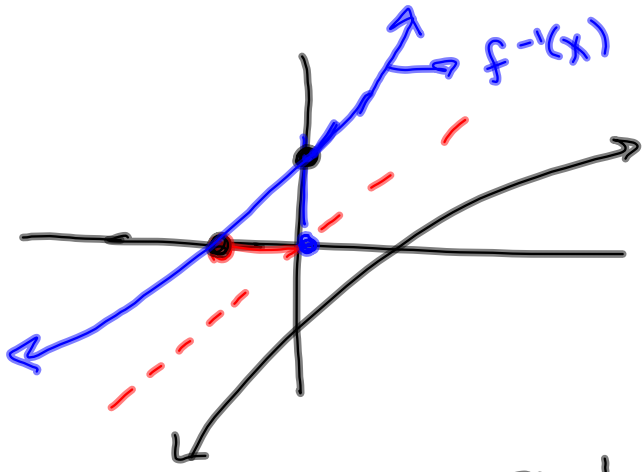
They're symmetric
to one another
about $y=x$
$g(x)$ is $f(x)$
reflected
around $y=x$

x	$f(x)=5x-4$
0	-4
$4/5$	0

x	$g(x)=\frac{x+y}{5}$
-4	0
0	$\frac{4}{5}$

$5x-4=0$
$5x=4$
$x=\frac{4}{5}$

$\frac{x+y}{5}=0$
$x+4=0$
$x=-4$



Reflect graph of $f(x)$ about $y=x$.

Sketch the graph of $f^{-1}(x)$