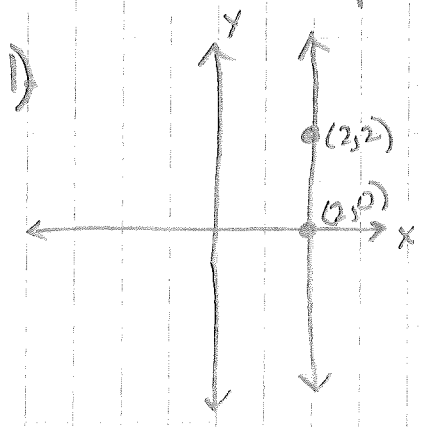
3.2 continued

Notes

Find the slope.

1)



First - Pick any 2 points

Then

x	y
2	0
2	2

$2-2=0$ $\quad 0-2=-2$

$$\frac{\text{change in } y}{\text{change in } x} = \frac{-2}{0} = \frac{\text{rise}}{\text{run}}$$

$$\text{slope} = m = \frac{-2}{0} = \text{undefined}$$

so the slope is undefined

2) (4, 2) (-2, 2) (given two points)

x	y
4	2
-2	2

$4-(-2)=6$ $\quad 2-2=0$

Is the table the only way? No you can use the slope formula

$$\frac{\text{change in } y}{\text{change in } x} = \frac{0}{6} = \frac{\text{rise}}{\text{run}}$$

$$\text{slope} = m = \frac{0}{6} = 0$$

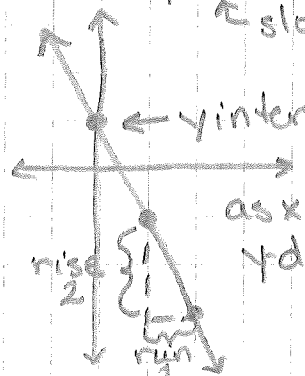
so the slope is zero

3.3 Linear Equations in Two Variables

So previously we looked at

$y = mx + b$ ← y-intercept

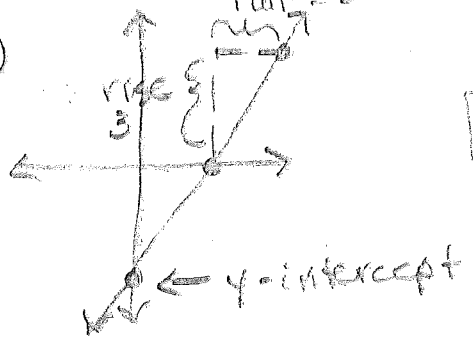
↑ slope



Notes

Write the equation in slope-intercept form $y = mx + b$

1)



$y = 2x - 3$

2) $m = \frac{1}{5}$ and $b = 2$

$y = \frac{1}{5}x + 2$

Find the slope and y-intercept and graph

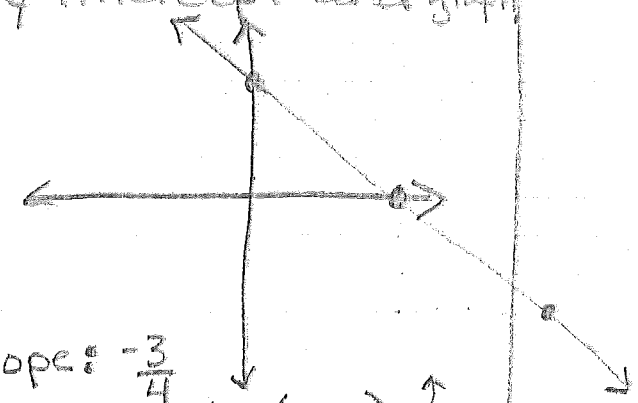
1) $3x + 4y = 12$

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

$4y = 12 - 3x$

$\frac{4y}{4} = \frac{12}{4} - \frac{3x}{4}$

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



slope: $-\frac{3}{4}$

y-intercept: $(0, 3)$

Write in point-slope and standard form

1) for the line that goes through $(-2, 4)$ and has a slope of $-\frac{3}{4}$

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

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

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

$y = -\frac{3}{4}x - \frac{6}{4} + \frac{16}{4}$

$y = -\frac{3}{4}x + \frac{10}{4}$

$y = -\frac{3}{4}x + \frac{5}{2}$ slope-intercept

Cont. → from slope-intercept to standard

Notes

$y = -\frac{3}{4}x + \frac{5}{2}$ standard form $ax+by=c$

$+\frac{3}{4}x \quad +\frac{3}{4}x$

$y = -\frac{3}{4}x + \frac{5}{2}$

$\frac{3}{4}x + y = \frac{5}{2}$

(standard form can not have fractions + a ≠ 1)

$\frac{4}{1}\left(\frac{3}{4}x\right) + 4(y) = \frac{4}{1}\left(\frac{5}{2}\right)$

$3x + 4y = 10$ standard form

Find an equation that is parallel to the line $2x+y=10$ and goes through the point $(-1,3)$

$-2x \quad -2x$

$2x + y = 10$

$y = 10 - 2x$

slope $= -2$ $\parallel m = -2$

$y - 3 = -2(x+1)$ point-slope form

(In order to write an equation of a line you need a slope and a point)

Find an equation that is perpendicular to the line $2x+y=10$ and passes through the point $(-1,3)$

$-2x \quad -2x$

$2x + y = 10$

$y = 10 - 2x$

slope $= -2$ $\perp m = \frac{1}{2}$

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

---

write the above line in standard form

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

$+3 \quad +3$

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

$y = \frac{1}{2}x + \frac{1}{2} + \frac{6}{2}$

$y = \frac{1}{2}x + \frac{7}{2}$ slope int form

$\left(-\frac{1}{2}x + y = \frac{7}{2}\right)^{-2}$

$\boxed{x - 2y = -7}$

3.4 Linear Inequalities in 2 variables

Notes

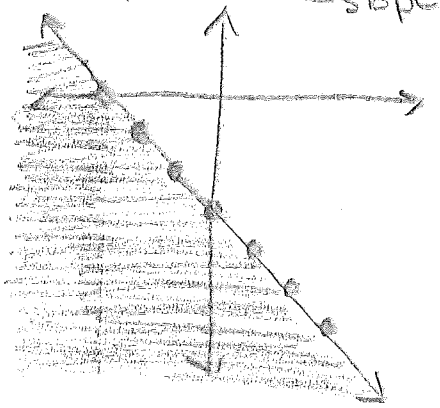
1) Graph $x + y \leq -3$

$-x \quad -x$

$y \leq -3 - x$

y-intercept

slope



Now pick any point not on the line and see if it is a solution.

(0,0)

$0 + 0 \leq -3$

$0 \leq -3$ False

Shade the side that represents the solutions.

2) $x + 4y > -3$ (0,0) $0 + 4(0) > -3$

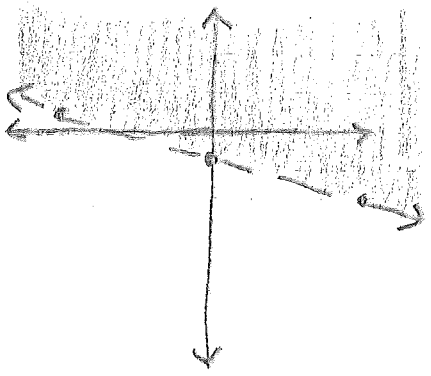
$0 > -3$ true

$-x \quad -x$

$4y > -3 - x$

$\frac{4y}{4} > \frac{-3}{4} - \frac{x}{4}$

$y > -\frac{3}{4} - \frac{1}{4}x$



3.5 Intro to Relations and Functions

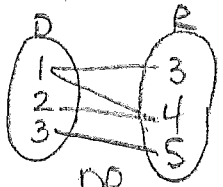
Is this a function?

1) $\{(1,2)(3,2)(4,2)\}$ yes D: {1,3,4} Independent
R: {2} Dependent

2) $\{(1,3)(1,4)(2,5)\}$ No D: {1,2}
R: {3,4,5}

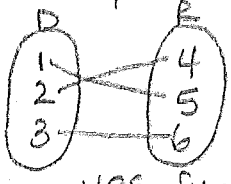
3) $\{(1,2)(2,3)(3,4)\}$ yes D: {1,2,3}
R: {2,3,4}

4)



no function

5)



yes function

6)

x	y
1	4
1	5
3	6

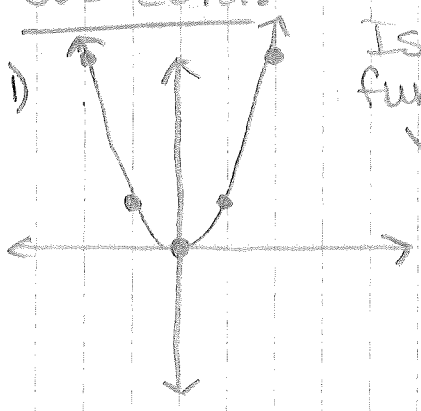
← Not a Function

Domain / Independent

Range / Dependent

Notes

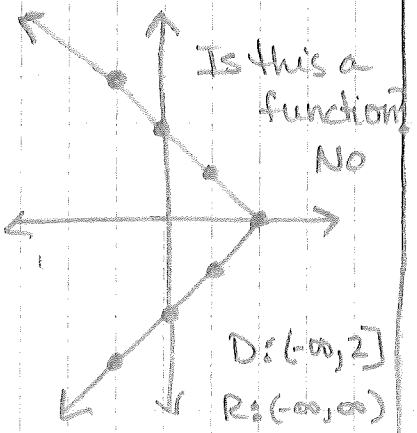
3.5 cont.

1) 

Is it a function? yes

D: $(-\infty, \infty)$

R: $[0, \infty)$

2) 

Is this a function? No

D: $(-\infty, 2]$

R: $(-\infty, \infty)$

Is it a function? and state domain + range

$y = 3x + 4$ (x: independent, y: dependent)

1) $y = 6x + 8$ function? yes — each value of x corresponds to 1 value of y

D: $(-\infty, \infty)$

---

2) $x - 2 = y^2$ function? No

D: $[2, \infty)$

---

3) $y = -\frac{6}{x}$ function? yes

D: $(-\infty, 0) \cup (0, \infty)$

3.6 Function Notation

$f(x) = x + 3$

1) find $f(-2) = -2 + 3 = 1$ (If $x = -2$ in this function then $y = 1$)

$f(-2) = 1$ or $(-2, 1)$

2) $f(y) = y + 3$

3.6 cont.

Notes

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

find $f(-2)$

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

$= -4 - 4 - 3$

$f(-2) = -11$ or $(-2, -11)$

2) find $f(a+2)$

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

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

$= -(a^2 + 2a + 2a + 4) + 2a + 4 - 3$

$= -a^2 - 2a - 2a - 4 + 2a + 4 - 3$

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

3) find $f(2)$

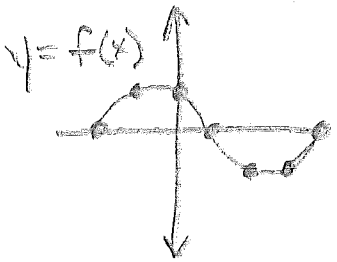
$f = \{(0,2)(1,3)(2,4)\}$

$f(2) = 4$

4) find $f(x) = 2$

$f(0) = 2$

given:



5) find $f(-1)$

$f(-1) = 1$

6) find $f(x) = -1$

$f(2) = -1$ and $f(3) = -1$

Write $2x - 4y = 6$ using function notation.

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

$-4y = 6 - 2x$

$\frac{-4y}{-4} = \frac{6}{-4} - \frac{2x}{-4}$

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

$f(x) = \frac{3}{2} + \frac{1}{2}x$