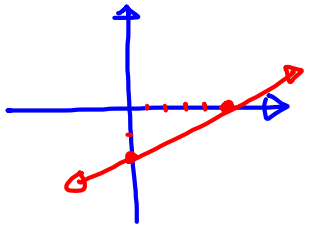
Math 115

Spring 2017

Lecture 11

① Graph $2x-5y=10$

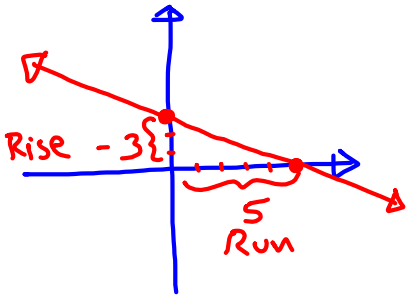
x	y
0	-2
5	0



② Graph $y=\frac{-3}{5}x+3$

Y-Int $(0,3)$

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

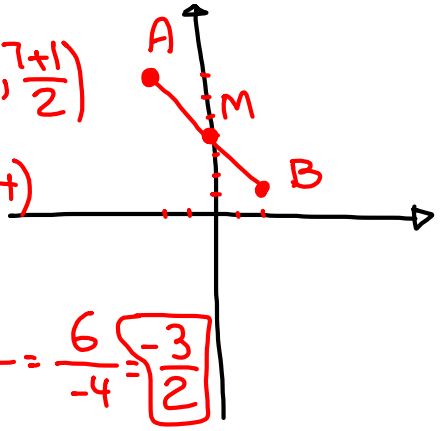


$A(-2,7)$, $B(2,1)$

① Draw $\overline{AB}$

② Find midpoint M $\rightarrow M\left(\frac{-2+2}{2}, \frac{7+1}{2}\right)$

$M(0,4)$



③ find slope $m = \frac{7-1}{-2-2} = \frac{6}{-4} = \boxed{\frac{-3}{2}}$

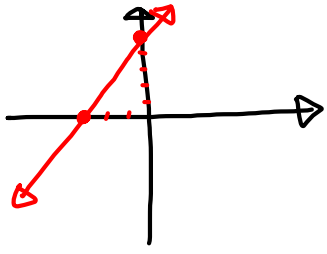
④ find the distance $d = \sqrt{(-2-2)^2+(7-1)^2}$

$= \sqrt{(-4)^2+(6)^2} = \sqrt{16+36} = \sqrt{52}$

$\approx \boxed{7.211}$

Graph using intercept method: $5x - 3y = -15$

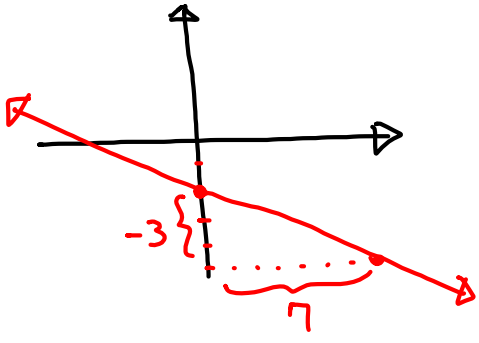
x	y
0	5
-3	0



Graph using Y-Int & slope: $y = \frac{-3}{7}x - 2$

Y-Int $(0,-2)$

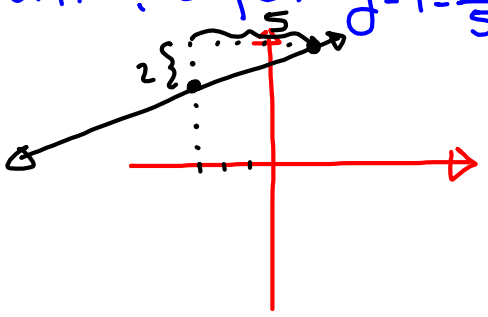
$m = \frac{-3}{7}$ Rise / Run



Graph using Point & Slope: $y-4=\frac{2}{5}(x+3)$

Point $(-3,4)$

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

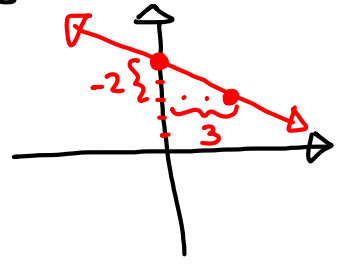


Convert to slope-Int, then graph: $2x+3y=15$

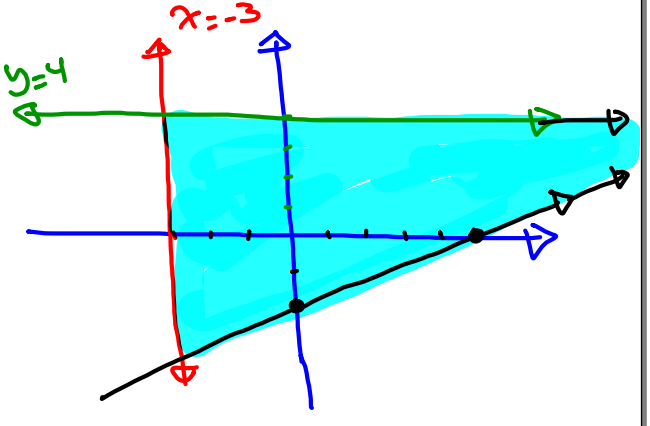
$3y=-2x+15$

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

$y=mx+b$



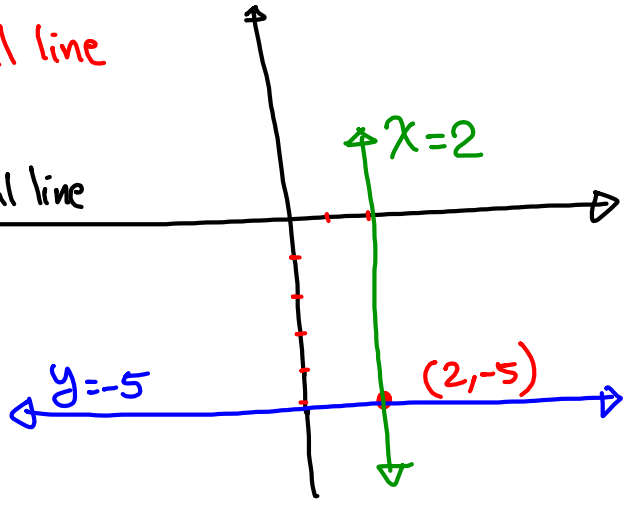
Graph $x=-3$, $y=4$, $y=\frac{2}{5}x-2$, shade the region which is bounded by all three lines.



Draw two lines that contain the point $(2,-5)$, one has zero slope, and the other one has no slope (undefined slope)

Zero Slope → Horizontal line

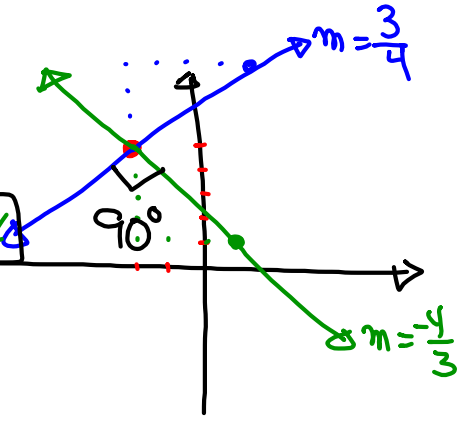
No slope or undefined slope → Vertical line



Draw two lines, one with slope $\frac{3}{4}$, and other one with slope $-\frac{4}{3}$ such that they intersect at $(-2,5)$.

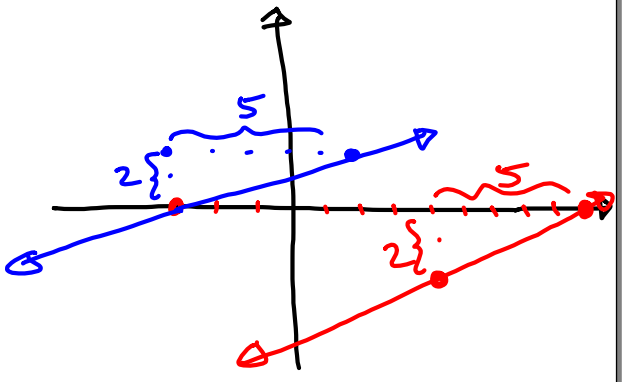
Anytime product of slopes is -1, lines are perpendicular

$$\frac{3}{4}\cdot\frac{-4}{3}=\frac{-12}{12}=-1$$



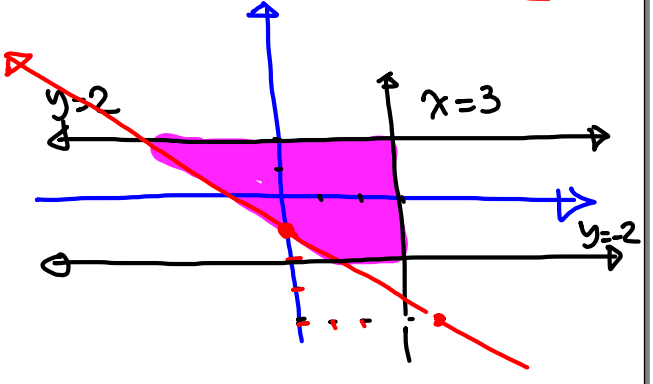
Draw two lines with slope $\frac{2}{5}$ such that one line contains $(-3,0)$ and the other line contains $(4,-2)$.

Same Slope $\Rightarrow$ Parallel lines



Graph $y=-2$, $x=3$, $y=2$, $y=\frac{-3}{4}x-1$.

Shade the region that is enclosed by all four lines.



Maria has $2.55 in dimes and nickels. the number of nickels is 1 fewer than twice the number of dimes. How many of each?

Categories	Value	Number	Amount
Dimes	10¢	x	$10x$
Nickels	5¢	$2x-1$	$5(2x-1)$

Total Amount is $255¢ = \$2.55$

$10x + 5(2x-1) = 255$

$10x + 10x - 5 = 255$

$20x = 260$

$x = 13$

13 Dimes & 25 Nickels

52 Tkts were Sold.

$379 was Collected.

Adults pay → $12

Kids pay → $5

How many of each?

Categories	Value	Number	Amount
Adults	12	x	$12x$
Kids	5	$52-x$	$5(52-x)$

$12x + 5(52-x) = 379$

$12x + 260 - 5x = 379$

$7x = 119$

$x = 17$

17 adults & 35 kids

Due Monday: SG7 (Redo), SG8, WP8

Exam II: Next Thursday

Finding equation of a line

when we have one point & slope

(x_1, y_1) m

Use Point–Slope formula $y - y_1 = m(x - x_1)$

and simply, final ans in slope-Int form $y = mx + b$.

Find eqn of a line that contains $(2, 3)$ with slope 4.

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

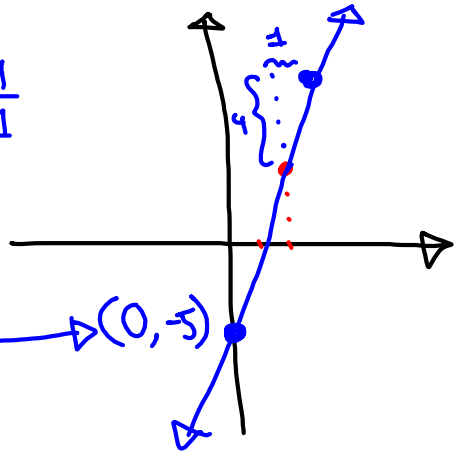
$y - 3 = 4(x - 2)$

$y - 3 = 4x - 8$

$y = 4x - 8 + 3$

$\boxed{y = 4x - 5}$

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



Find eqn of a line that contains $(-2, 3)$ and is parallel to the line $y = \frac{1}{2}x - 4$.

$(x_1, y_1) = (-2, 3)$

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

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

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

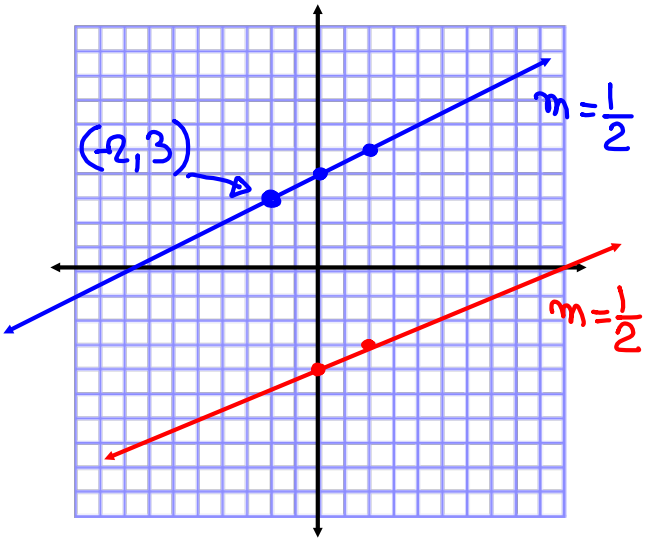
$y - 3 = \frac{1}{2}(x + 2)$

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

$\boxed{y = \frac{1}{2}x + 4}$

Graph $y = \frac{1}{2}x - 4$

$y = \frac{1}{2}x + 4$



Find equation of a line that contains $(0,-2)$ and is perpendicular to the line $y = \frac{3}{5}x + 2$.

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

↳ flip it over, change the sign

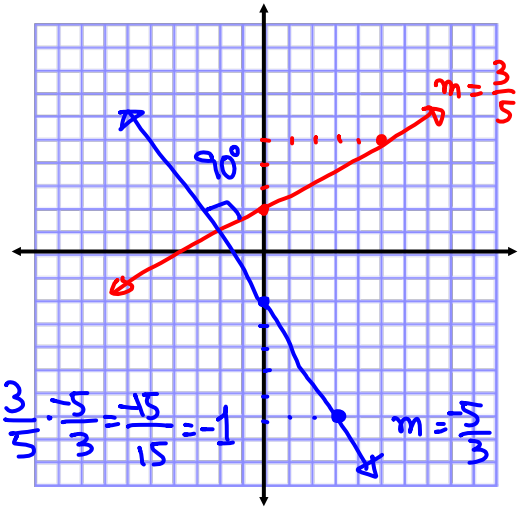
$m = \frac{-5}{3}$

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

$y - -2 = \frac{-5}{3}(x - 0)$

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

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



Finding equation of a line with two Points

find eqn of a line that contains $(0,2)$ and $(4,3)$

$$m = \frac{2-3}{0-4} = \frac{-1}{-4} = \boxed{\frac{1}{4}}$$

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

$y - 2 = \frac{1}{4}(x - 0)$

$y - 2 = \frac{1}{4}x$

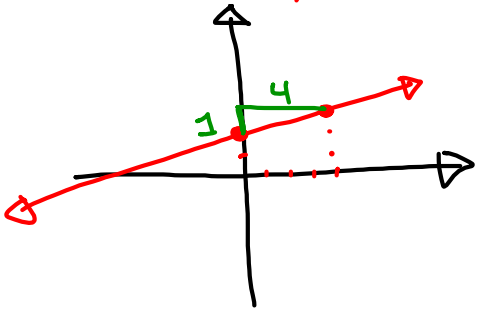
$\boxed{y = \frac{1}{4}x + 2}$

(x_1, y_1) & (x_2, y_2)

① find $m = \frac{y_1 - y_2}{x_1 - x_2}$

② use $y - y_1 = m(x - x_1)$

③ Slope Int. form.



Find eqn of a line that contains $(-4,3)$ and $(0,-2)$. final Ans in Slope-Int. form. Graph too.

we have two Points

$(-4,3)$, $(0,-2)$

we need slope

$$m = \frac{3-(-2)}{-4-0} = \frac{5}{-4} = \boxed{\frac{-5}{4}}$$

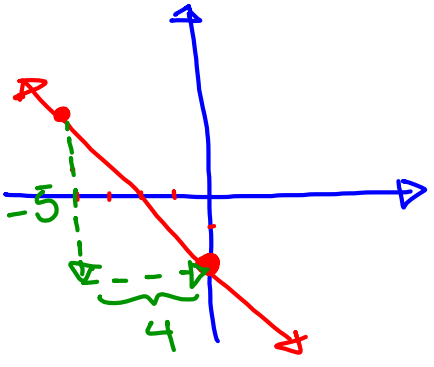
Now use point-slope form

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

$y - -2 = \frac{-5}{4}(x - 0)$

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

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



Find the eqn of a line that Contains $(-5, 4)$ with

a) Zero Slope ⇓ Horizontal line ⇓ $y = b$ → $\boxed{y = 4}$

b) No slope ⇓ Vertical line ⇓ $x = a$ → $\boxed{x = -5}$

c) undefined slope ⇓ Vertical line ⇓ $x = a$ → $\boxed{x = -5}$

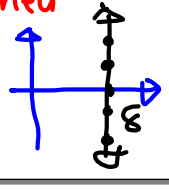
Find eqn of a line that contains $(5, -3)$ & $(-2, -3)$.

$$m = \frac{-3-(-3)}{5-(-2)} = \frac{-3+3}{5+2} = \frac{0}{7} = 0$$

→ Zero Slope, Horizontal line, $y = b$, $\boxed{y = -3}$

Find eqn of a line that contains $(8, 0)$ & $(8, -4)$

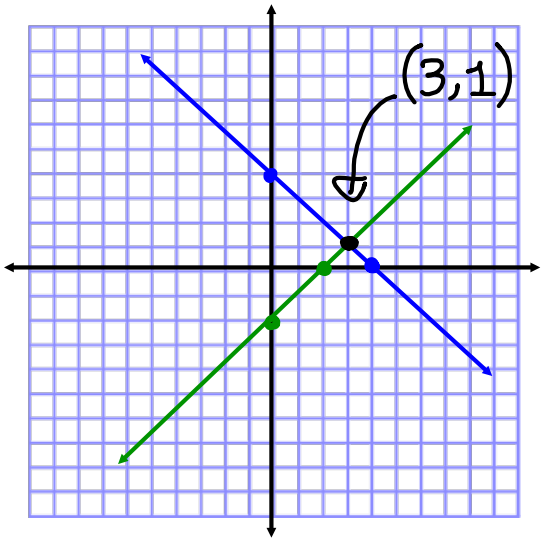
$$m = \frac{0-(-4)}{8-8} = \frac{4}{0}$$ undefined → no Slope, Vertical line, $x = a$, $\boxed{x = 8}$



Graph $\begin{cases} x + y = 4 \\ x - y = 2 \end{cases}$

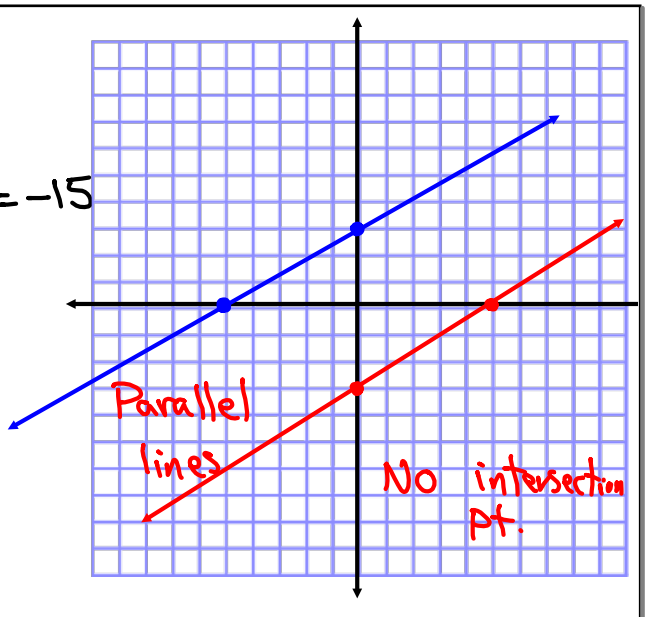
x	y
0	4
4	0

x	y
0	-2
2	0



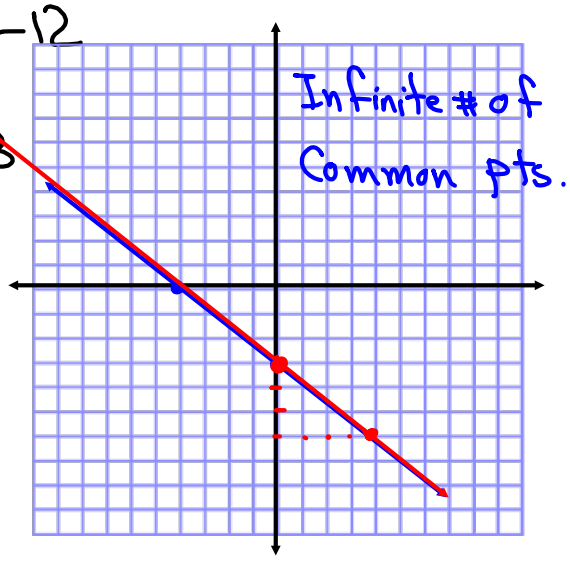
Graph $\begin{cases} y = \frac{3}{5}x - 3 \\ 3x - 5y = -15 \end{cases}$

x	y
0	3
-5	0



Graph $\begin{cases} 3x + 4y = -12 \\ y = \frac{-3}{4}x - 3 \end{cases}$

x	y
0	-3
-4	0



Graphing inequalities: Vertical lines

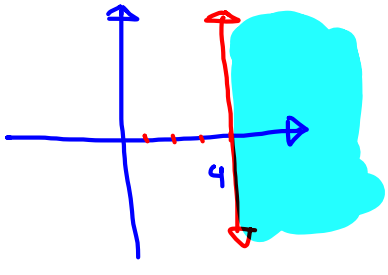
$x < a$ $\quad x \leq a$ ⇔ Shade left

$x > a$ $\quad x \geq a$ ⇔ Shade right

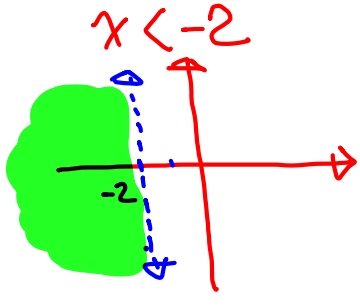
$x > a$: Dotted lines

$x \geq a$: Solid lines

ex: $x \geq 4$



$x < -2$



Graphing inequalities: Horizontal line

$y < b$ $\quad y \leq b$ ⟺ Shade below

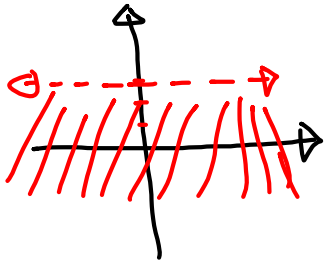
$y > b$ $\quad y \geq b$ ⟺ Shade above

$y > b$: Dotted line

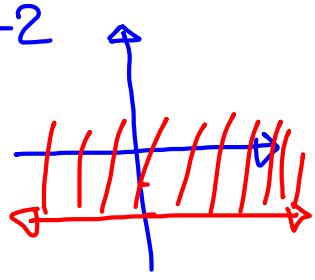
$y \geq b$: Solid line

Graph & Shade

$y < 3$



$y \geq -2$



Graphing inequalities: Slant lines

$y < mx+b$ $\quad y \leq mx+b$ ⟺ Shade below

$y > mx+b$ $\quad y \geq mx+b$ ⟺ Shade above

$y > mx+b$: Dotted line

$y \geq mx+b$: Solid line

Graph & Shade

$y > \frac{2}{3}x - 2$