Math 115

Spring 2018

Lecture 12

$? \; a^2 + b^2 = c^2 \; ?$

$y = mx + b \quad ? \quad d = rt$

Graphing Linear inequalities:

① Vertical lines

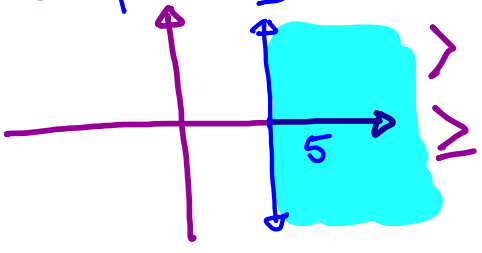
$x < a$ $\quad x \leq a$ Shade to the left

$x > a$ $\quad x \geq a$ Shade to the right

$x > a$: Dashed line

$x \geq a$: Solid line

Graph $x \geq 5$ — x-only → Vertical line



$>$ Shade to the right

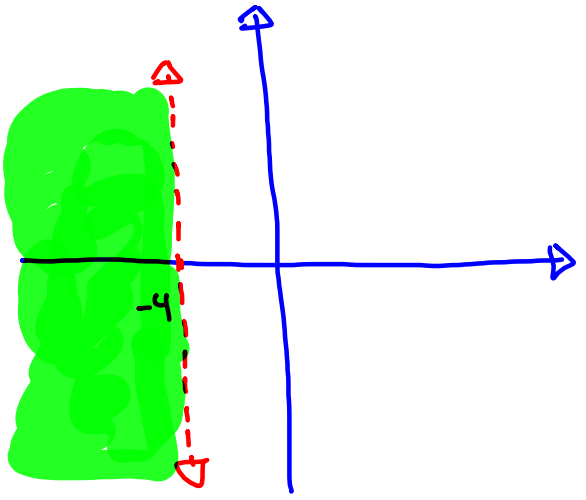
$\geq$ Solid line

Graph $x < -4$

x-only → V.L.

< shade to left

< dashed line



② Horizontal line

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

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

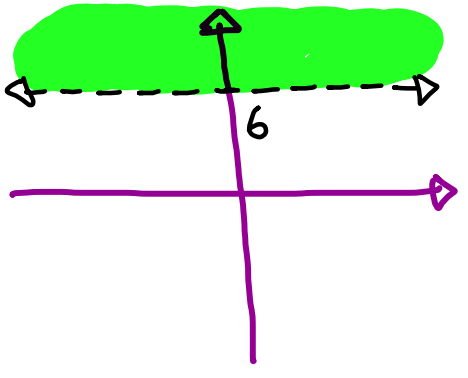
Dashed line

Solid line

Graph

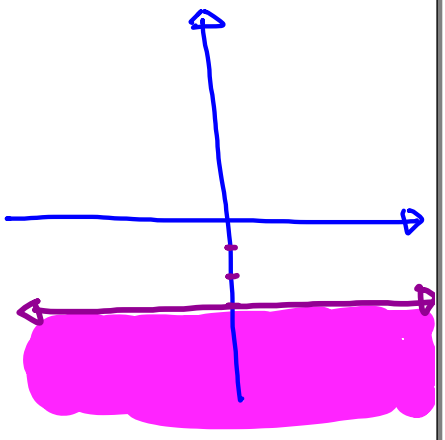
$y > 6$

H.L., Shade above, dashed line

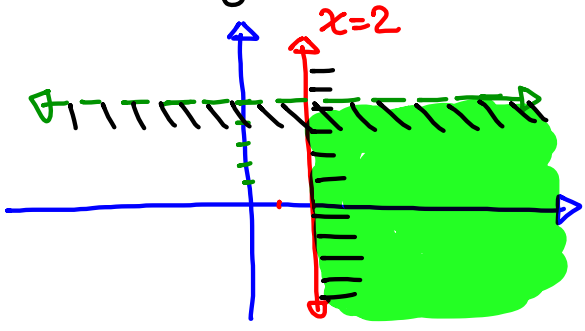


Graph $y \leq -3$

H.L., $\leq$ Shade below Solid line



Graph $\begin{cases} x \geq 2 \\ y < 5 \end{cases}$



③ Slant lines

Standard form:
- $Ax + By < C$ $\quad Ax + By \leq C$
- $Ax + By > C$ $\quad Ax + By \geq C$

Slope-Int form:
- $y < mx + b$ $\quad y \leq mx + b$
- $y > mx + b$ $\quad y \geq mx + b$

Dashed lines $\quad$ Solid lines

① write the problem in Slope-Int form

② Graph the line (Solid or dashed)

③ $<$ or $\leq \Rightarrow$ Shade below

$>$ or $\geq \Rightarrow$ Shade above

Graph $2x + 3y \geq 6$

write it in slope-Int form

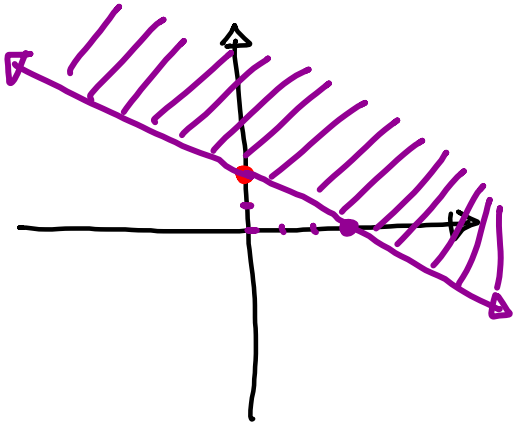
$$3y \geq -2x + 6$$

$$y \geq \frac{-2}{3}x + \frac{6}{3}$$

$y \geq \frac{-2}{3}x + 2$

↑ Solid

Shade above



$4x - 3y > 9$, Graph & Shade

write in slope-Int form

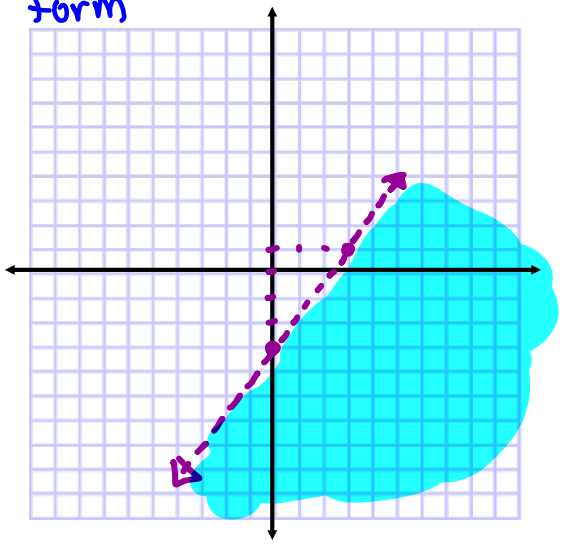
$-3y > -4x + 9$

$$\frac{-3}{-3}y < \frac{-4}{-3}x + \frac{9}{-3}$$

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

broken (dashed)

Shade below

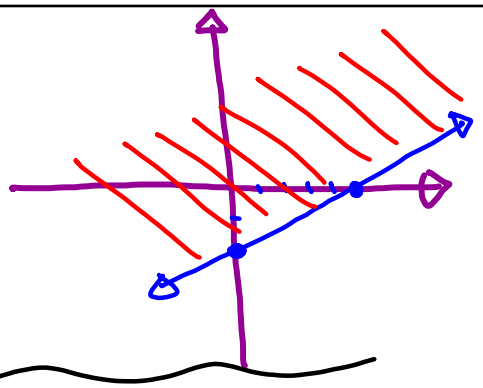


Graph & shade

$y \geq \frac{2}{5}x - 2$

Solid

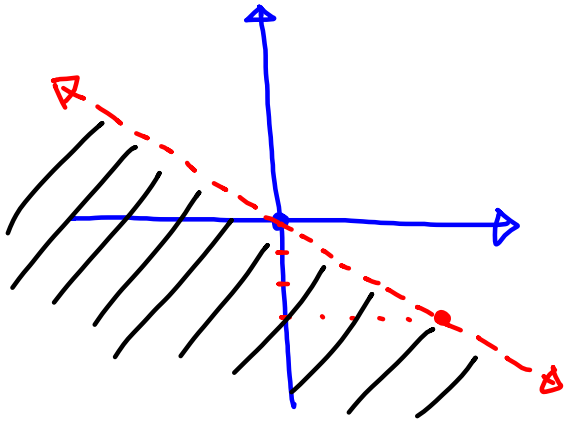
Shade above



Graph & shade

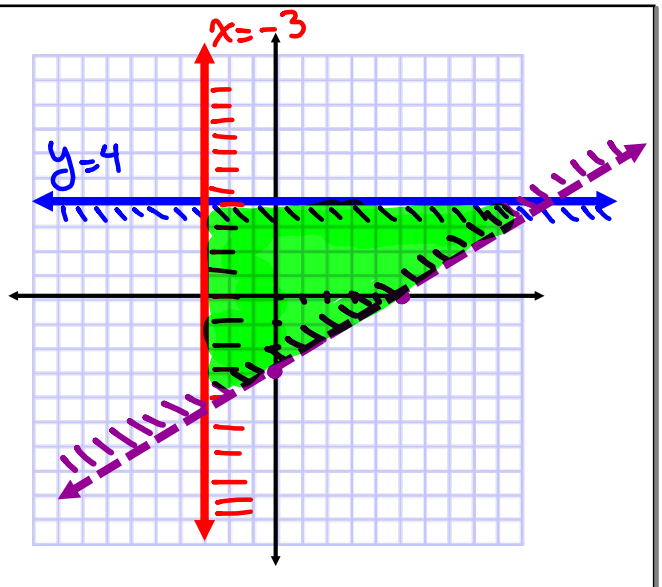
$y < \frac{-3}{5}x$

dashed, Shade below



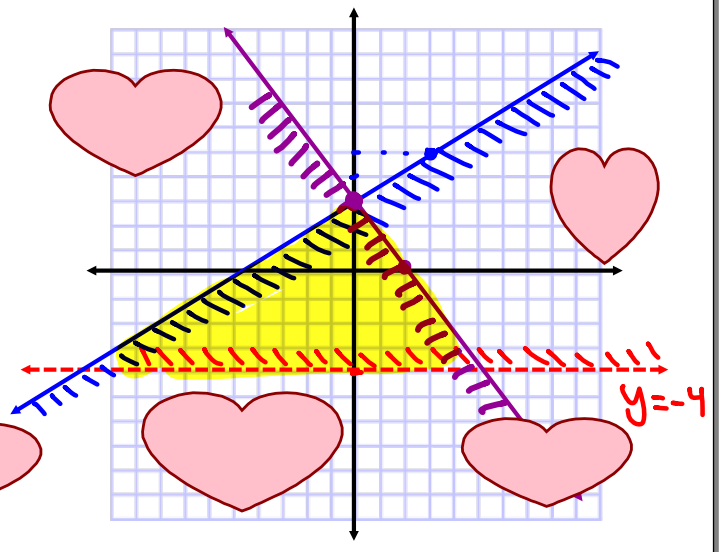
Graph & shade

$$\begin{cases} y \leq 4 \\ x \geq -3 \\ y > \frac{3}{5}x - 3 \end{cases}$$

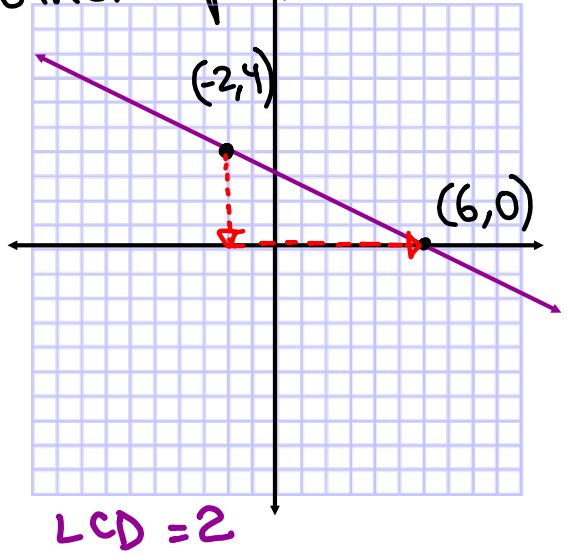


Graph & shade

$$\begin{cases} y > -4 \\ y \le \frac{2}{3}x + 3 \\ y \le \frac{-3}{2}x + 3 \end{cases}$$



Find equation of the line below



$$m = \frac{\text{Rise}}{\text{Run}} = \frac{-4}{8} = \frac{-1}{2}$$

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

$$y - 0 = \frac{-1}{2}(x - 6)$$

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

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

Slope-Int form $y = mx + b$

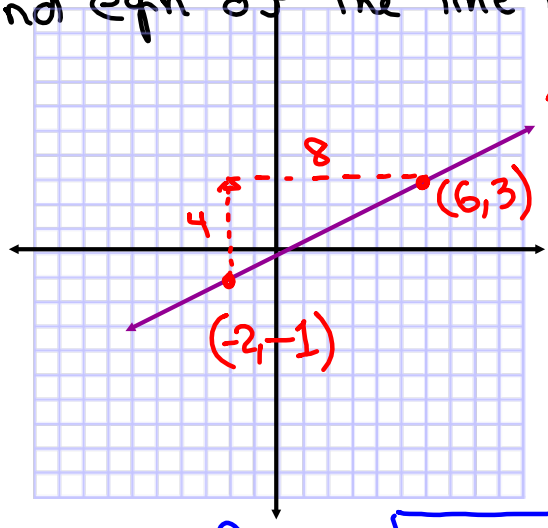
LCD = 2

$$2y = -x + 6$$

$$x + 2y = 6$$

Standard form $Ax + By = C$

Find eqn of the line below



$m = \frac{4}{8} = \frac{1}{2}$

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

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

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

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

$\boxed{y = \frac{1}{2}x}$ (0,0)

Slope-Int form

LCD = 2

$2y = x$

$-x + 2y = 0$

$\boxed{x - 2y = 0}$

Find the equation of a line Parallel to $3x + 5y = 10$ that contains the point $(-2, -5)$

$3x + 5y = 10$ Stand. Form

↳ Slope-Int. form

$5y = -3x + 10$

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

Parallel lines

⇒ Same slope

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

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

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

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

LCD = 5

$5y + 25 = -3(x + 2)$

$5y + 25 = -3x - 6$

$3x + 5y = -6 - 25$

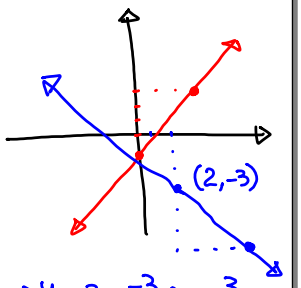
$\boxed{3x + 5y = -31}$

Stand. form

$5y = -3x - 31$

Slope-Int. $\boxed{y = \frac{-3}{5}x - \frac{31}{5}}$

Find eqn of a line that contains $(2,-3)$ and is perpendicular to the line $y = \frac{4}{3}x - 1$. Ans in slope-Int form. Graph both lines.



Perpendicular lines
⇒ Slopes are opposite reciprocal

$-\frac{3}{4}$

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

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

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

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

LCD = 4

$4y + 12 = -3x + 6$

$4y = -3x - 6$

$Ax + By = C$

$3x + 4y = -6$

Stand. form

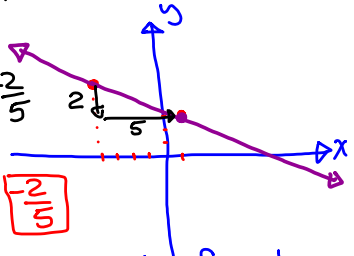
$y = mx + b$

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

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

slope-Int. form

Find equation of a line that contains $(-4,5)$ and $(1,3)$. Graph the line. Ans in slope-Int form and standard form.



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

$= \frac{5-3}{-4-1} = \frac{2}{-5} = \frac{-2}{5}$

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

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

$y - 3 = -\frac{2}{5}(x - 1)$

LCD = 5

$5y - 15 = -2(x-1)$

$5y - 15 = -2x + 2$

$Ax + By = C$

$2x + 5y = 17$

Standard form

$y = mx + b$

$5y = -2x + 17$

$y = -\frac{2}{5}x + \frac{17}{5}$

Slope-Int. form

SG 9 is due

on

Monday.