Math 115

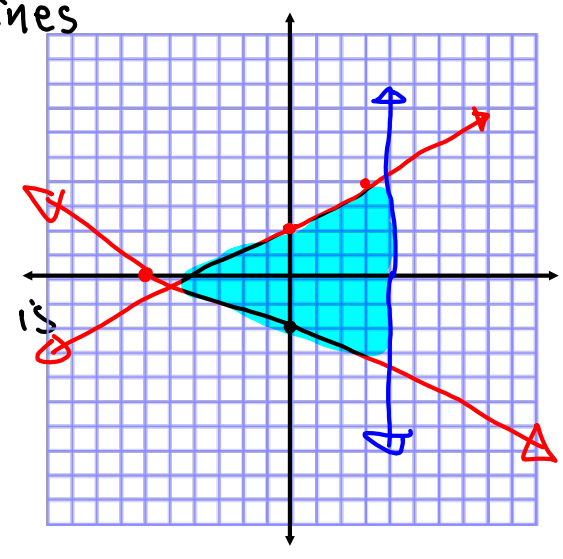
Winter 2017

Lecture 6

Graph the following lines

$$\begin{cases} y = \frac{2}{3}x + 2 \\ x + 3y = -6 \\ x = 4 \end{cases}$$

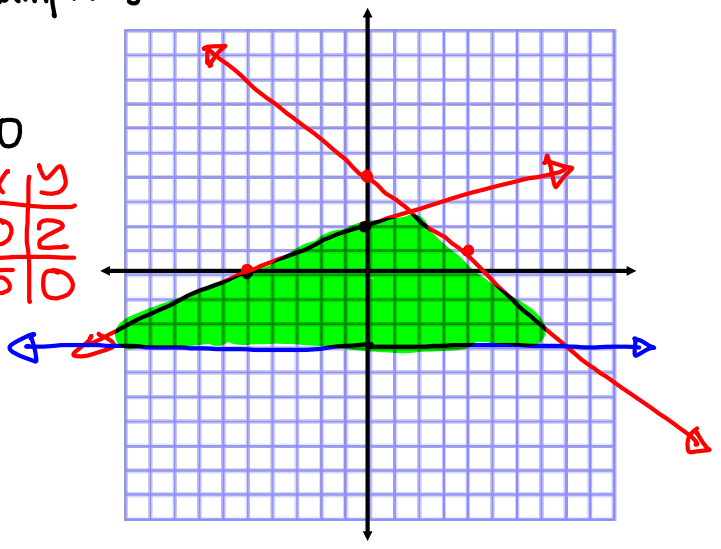
Shade the region that is enclosed by all three lines.



Repeat last example for

$$\begin{cases} y = \frac{-3}{4}x + 4 \\ 2x - 5y = -10 \\ y = -3 \end{cases}$$

x	y
0	2
-5	0



Solve for specific variable:

1) $A = 2L - 3W \; ; \; L$

$A + 3W = 2L$

$\frac{A+3W}{2} = L$

2) $P = \frac{3}{4}xy^2 \; ; \; x$

$4P = 4 \cdot \frac{3}{4}xy^2$

$4P = 3xy^2$

$\frac{4P}{3y^2} = \frac{3xy^2}{3y^2}$

$\frac{4P}{3y^2} = x$

3) $4x - 3y = 6 \; ; y$

Stand. form

$\Rightarrow$ Slope-Int form

$y = mx + b$

$-3y = -4x + 6$

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

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

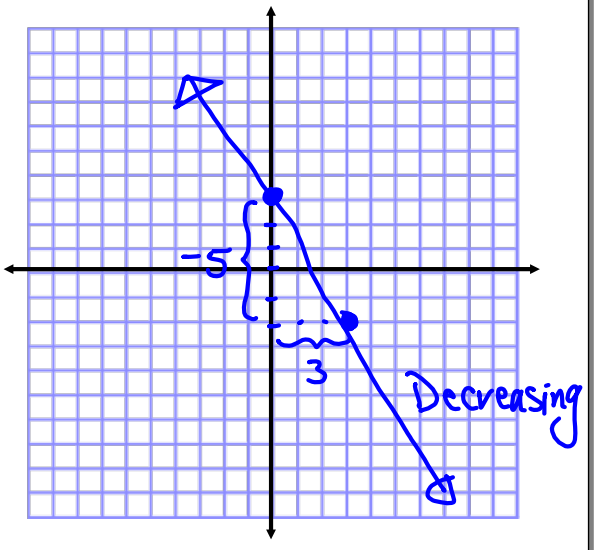
Convert to Slope-Int form,
Give Y-Int & slope, then
graph: $5x + 3y = 9$

$3y = -5x + 9$

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

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

$m = \frac{-5}{3}$, Y-Int $(0,3)$



Find slope for the lines described below:

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

2) $x = 5$ → V.L.
→ Slope undefined
→ No slope

3) $y = -4$ → H.L.
→ $m = 0$

4) line that contains $(2,5)$ & $(-1,4)$

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

5) $6x - 7y = 28$

$-7y = -6x + 28$

$y = \frac{-6}{-7}x + \frac{28}{-7}$

$m = \frac{6}{7}$

Given $A(-3,7)$, find slope of the line $\overleftrightarrow{AB}$ such that

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

1) $B(2,7)$

$(2,7)$ & $(-3,7)$

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

2) $B(-3,4)$

$(-3,4)$ & $(-3,7)$

$m = \frac{4-7}{-3-(-3)} = \frac{-3}{0}$ $\quad \emptyset$ NO Slope

3) $B(0,0)$

$(0,0)$ & $(-3,7)$

$m = \frac{0-7}{0-(-3)} = \boxed{\frac{-7}{3}}$

4) $B(8,-2)$

$(8,-2)$ & $(-3,7)$

$m = \frac{-2-7}{8-(-3)} = \boxed{\frac{-9}{11}}$

Use $y - y_1 = m(x - x_1)$ to find eqn of the line

1) with slope 4 & Point $(-3,1)$.

$y - 1 = 4(x - (-3))$

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

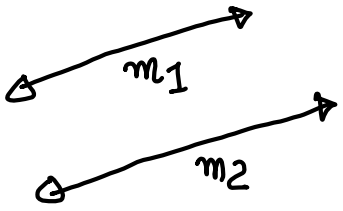
$y - 1 = 4x + 12$

$\boxed{y = 4x + 13}$

$m = 4$

Y-Int $(0,13)$

Two lines are parallel $\Leftrightarrow$ Same Slope



Parallel lines $\Leftrightarrow m_1 = m_2$

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

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

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

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

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

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

See last example to find eqn of a line that contains $(0, -2)$ and is parallel to the line $3x - 4y = -8$.

$y = mx + b$

$-4y = -3x - 8$

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

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

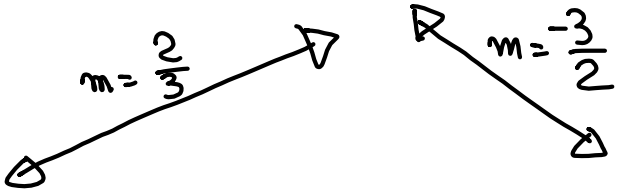
$y - -2 = \frac{3}{4}(x - 0)$

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

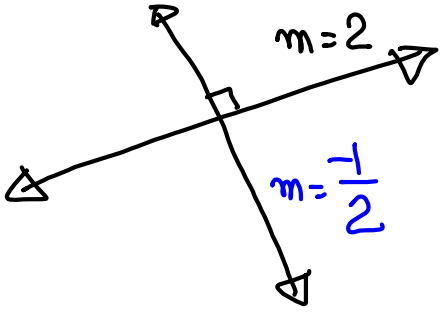
$y = \frac{3}{4}x - 2$

Two lines are perpendicular if the product of their slopes is -1.

Perpendicular lines $\Leftrightarrow m_1 \cdot m_2 = -1$



$\frac{2}{3} \cdot \frac{-3}{2} = \frac{-6}{6} = -1$



$2 \cdot m = -1$

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

they are opposite reciprocal

Check $2 \cdot \frac{-1}{2} = -1$

Find eqn of a line that contains (0, 2) and $\perp$ to the line $y = \frac{3}{5}x - 4$.

Perpendicular

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

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

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

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

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

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

y-Int (0, 2)

See last example to find eqn of line that contains $(4,-3)$ and is perpendicular to the line $y = -2x + 1$.

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

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

$y - -3 = \frac{1}{2}(x - 4)$

$y + 3 = \frac{1}{2}x - \frac{1}{2} \cdot 4$

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

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

$\boxed{y = \frac{1}{2}x - 5}$

$m = \frac{1}{2}$, Y-Int $(0,-5)$

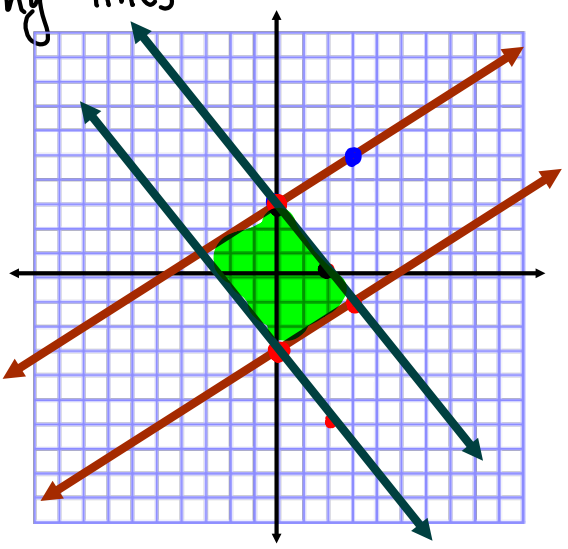
Graph the following lines

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

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

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

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



Graph a line that contains $(-3,2)$ with slope $\frac{2}{3}$. Then find its eqn in slope-Int. form.

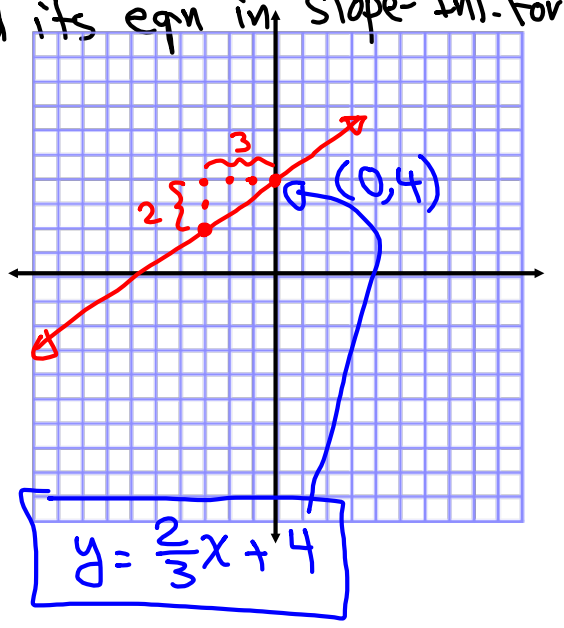
$y - y_1 = m(x - x_1)$

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

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

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

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



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

See last example to draw a line that contains $(4,-2)$ with slope $-\frac{1}{2}$. then find its eqn in slope-Int. form.

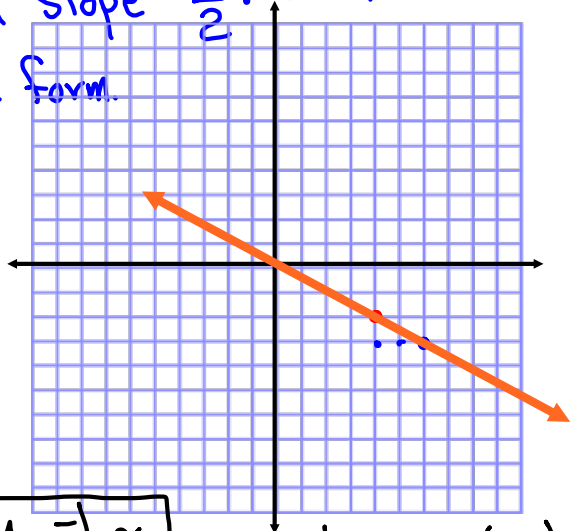
$y - y_1 = m(x - x_1)$

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

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

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

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



$m = \frac{-1}{2}$, Y-Int $(0,0)$

Solve, and graph

$-4 < 2x + 4 \leq 10$

$-4-4 < 2x+4-4 \leq 10-4$

$-8 < 2x \leq 6$

$\frac{-8}{2} < x \leq \frac{6}{2}$

$-4 < x \leq 3$

I.N.

$(-4, 3]$

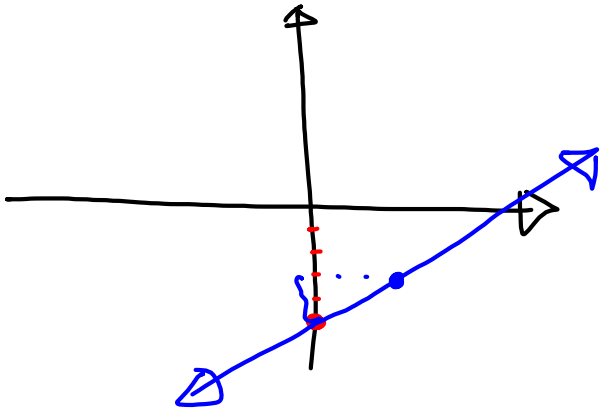
Rewrite in slope-Int, then graph

$2x - 3y = 15$

$-3y = -2x + 15$

$y = \frac{-2}{-3}x + \frac{15}{-3}$

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



① Simplify: $(2^3 - 4^2)^2 - \sqrt{10^2 - 6^2}$

$= (8 - 16)^2 - \sqrt{100 - 36} = (-8)^2 - \sqrt{64} = 64 - 8$

$= \boxed{56}$

② Evaluate: $-b - \sqrt{b^2 - 4ac}$ for

$a = 0$, $b = 6$, and $c = -10$

$= -6 - \sqrt{6^2 - 4(0)(-10)} = -6 - \sqrt{36 - 0}$

$= -6 - \sqrt{36} = -6 - 6$

$= \boxed{-12}$

① Simplify: $3(x^2 - 5x + 4) - 5(x^2 - 3x - 1)$

$= 3x^2 - 15x + 12 - 5x^2 + 15x + 5$

$= \boxed{-2x^2 + 17}$

② Evaluate $\dfrac{x^2 - 81}{x + |-x|}$ for $x = -9$

$= \dfrac{(-9)^2 - 81}{-9 + |-(-9)|} = \dfrac{81 - 81}{-9 + |9|} = \dfrac{0}{-9 + 9} = \dfrac{0}{0}$

Indeterminate

① Name the properties used:

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

$4(3x)+4(1)-4=$ Associative & Identity

$(4\cdot3)x+4-4=$

Inverse

$12x+0=$

Identity

$12x$

① Translate only:

-3 times the difference of 5 and some number is equal to square of the number.

$-3\cdot(5-x)=x^2$

① 8% of what number is 125?

$\frac{8}{100} \cdot x = 125$ → $x = \frac{125}{.08}$

$.08x = 125$

$x = 1562.5$

8% of 1562.5 is 125.

② 2.5 inches on the map is for 150 miles.

Two cities are 8 inches apart on map, find actual distance.

$\frac{2.5 \text{ inches}}{150 \text{ Miles}} = \frac{8 \text{ inches}}{x \text{ Miles}}$ → $\frac{2.5}{150} = \frac{8}{x}$

$2.5x = 8(150)$

$x = \frac{8(150)}{2.5}$ $x = 480$

480 Miles

① Solve: $4x - 8 = 3(2x + 5) - 7$

$4x - 8 = 6x + 15 - 7$

$4x - 8 = 6x + 8$

$4x - 6x = 8 + 8$

$-2x = 16$

$x = -8$ → $\{-8\}$

② $\frac{3}{4}(x - 3) + 1 = \frac{1}{5}(x + 2) - 1$

LCD = 20

$\cancel{20}^{5} \cdot \frac{3}{\cancel{4}}(x - 3) + 20 \cdot 1 = \cancel{20}^{4} \cdot \frac{1}{\cancel{5}}(x + 2) - 20 \cdot 1$

$15x - 45 + 20 = 4x + 8 - 20$

$15x - 25 = 4x - 12$

$15x - 4x = -12 + 25$

$11x = 13$

$x = \frac{13}{11}$

$\left\{\frac{13}{11}\right\}$

Solve $-2x + 8 < 3(x-1) - 4$

express your final ans in all three different ways.

$-2x + 8 < 3x - 3 - 4$

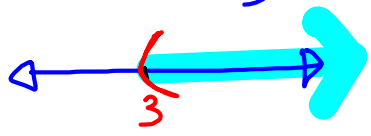
$-2x + 8 < 3x - 7$

$-2x - 3x < -7 - 8$

$-5x < -15$

$x > 3$

S.B.N. $\{x \mid x > 3\}$

Graph 

I.N. $(3, \infty)$

Find two consecutive odd integers such that 3 times the larger one is equal to the difference of 101 and twice the smaller one.

x & $x+2$

19 & 21

3 · larger = 101 − 2 · smaller

$3(x+2) = 101 - 2 \cdot x$

$3x + 6 = 101 - 2x$

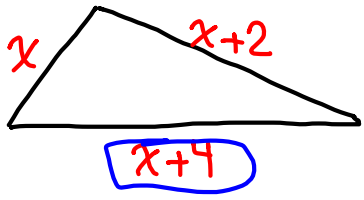
$3x + 2x = 101 - 6$

$5x = 95$

$x = 19$

Three sides of a triangle with perimeter 39 inches are three cons. odd integers.

Find the largest side.



$11+4=15$

15 inches

$P=39$

$a+b+c=39$

$x+x+2+x+4=39$

$3x+6=39$

$3x=33$

$x=11$

Exam 1

Starts @ 6:00, You can begin @ 5:50.

SG 4, 5, 6, and 7 due Thursday before you start the test.

we resume lecture @ 7:45.

Cal. OK, No Scantron.