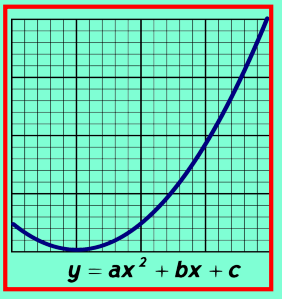
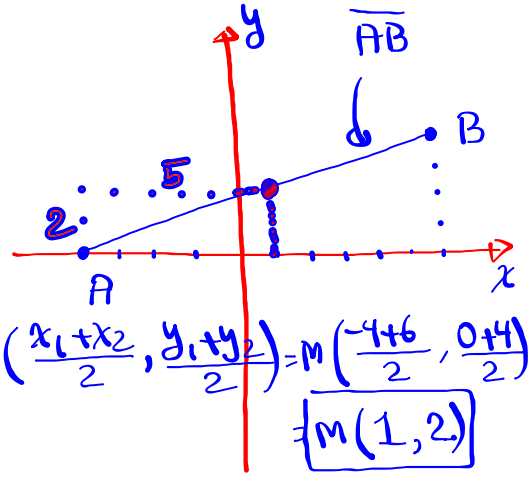
Math 125
Spring 2021
Lecture 3



$A(-4,0)$, $B(6,4)$

1) Draw $\overline{AB}$ line Segment



2) Find midpoint M

$$M\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) = M\left(\frac{-4+6}{2}, \frac{0+4}{2}\right)$$

$$= \boxed{M(1,2)}$$

3) Find Slope m

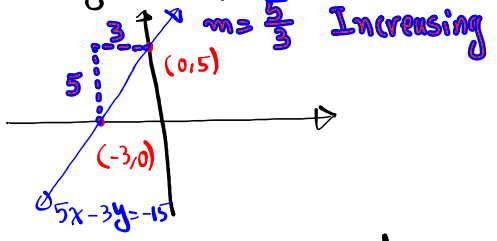
$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{0-4}{-4-6} = \frac{-4}{-10} = \boxed{\frac{2}{5}}$$

$$d(A,B) = \sqrt{(x_1-x_2)^2 + (y_1-y_2)^2} = \sqrt{(-4-6)^2 + (0-4)^2} \approx \boxed{10.770}$$

$$= \sqrt{(-10)^2 + (-4)^2} = \sqrt{100+16} = \sqrt{116}$$

Graph $5x - 3y = -15$ by intercept method.

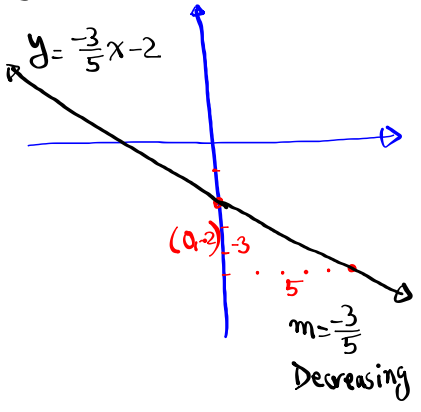
x	y
0	5
-3	0



Graph $y = \frac{-3}{5}x - 2$ by Slope-Int. method.

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

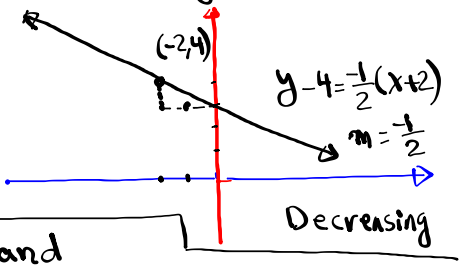
Y-Int $(0,-2)$



Graph $y - 4 = \frac{-1}{2}(x + 2)$ using Point-Slope.

Point $(-2,4)$

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



Graph $x = 4$, $y = -3$, and $y = \frac{3}{4}x$ on the same coordinate System.

$x = 4$ V.L.

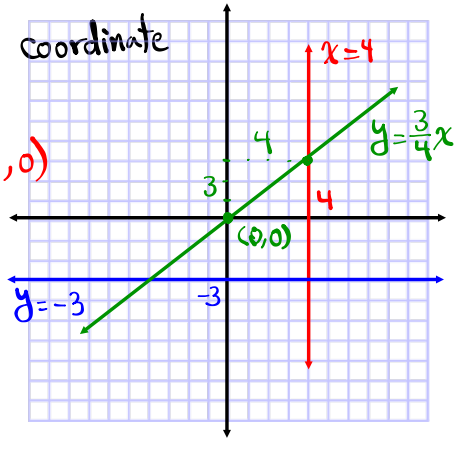
$y = -3$ H.L.

$y = \frac{3}{4}x$ S.L.

Slope-Int. form

$m = \frac{3}{4}$

Y-Int $(0,0)$



Draw $y=3$, $y=\frac{-2}{5}x-2$, and $y=\frac{5}{2}x-2$ in the same coordinate system, then shade the region enclosed by all three lines.

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

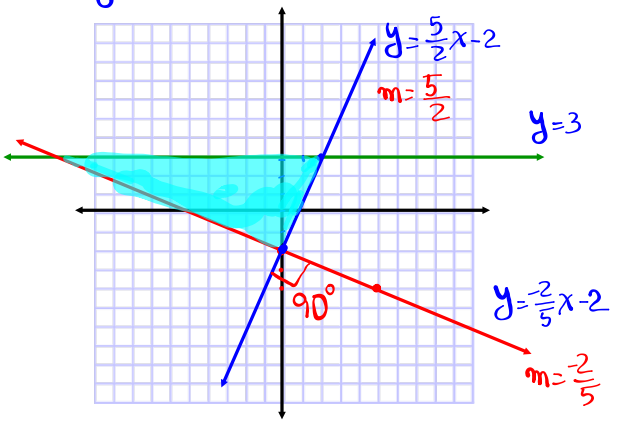
$m=\frac{-2}{5}$

Y-Int $(0,-2)$

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

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

Y-Int $(0,-2)$



$\frac{5}{2}\cdot\frac{-2}{5}=\frac{-10}{10}=-1$

Lines are perpendicular to each other.

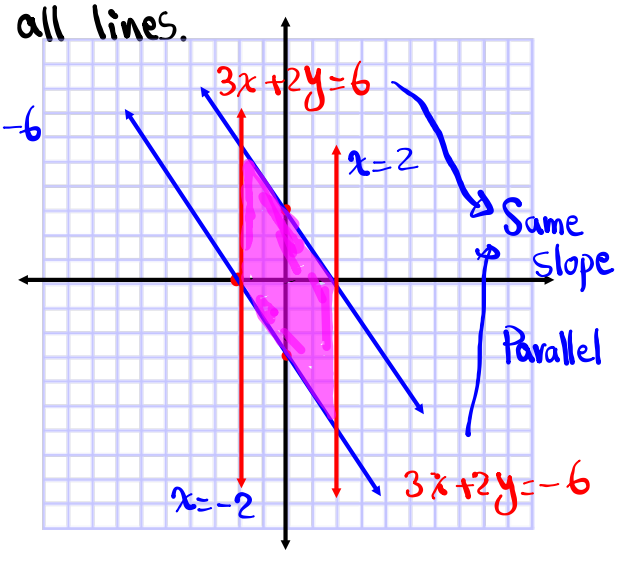
Graph $3x+2y=6$, $3x+2y=-6$, $x=2$, and $x=-2$ in the same coordinate system, shade the region enclosed by all lines.

$3x+2y=6$

x	y
0	3
2	0

$3x+2y=-6$

x	y
0	-3
-2	0



SG 0 is due. ✓

SG 1 ⇐ work on it.

SG 2

$Ax+By=C \iff y=mx+b$

Standard Form of equation of a line

Slope-Int Form of equation of a line

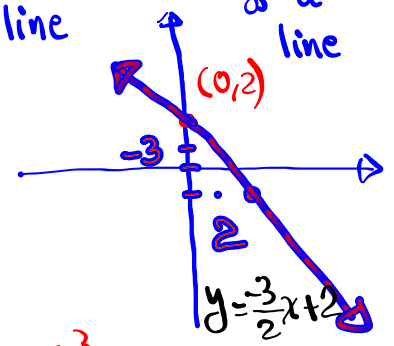
$3x+2y=4$ Standard Form

$2y=-3x+4$

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

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

Slope-Int Form Y-Int $(0,2)$



$5x-3y=9$

1) write in slope-Int. Form

$5x-3y=9$

$-3y=-5x+9$

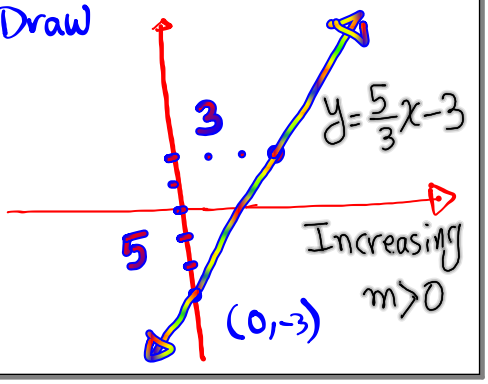
$\frac{-3}{-3}y=\frac{-5}{-3}x+\frac{9}{-3}$

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

2) Y-Int $(0,-3)$

3) Slope $m=\frac{5}{3}$

4) Draw



Given $y = \frac{3}{4}x + 2$, find y when

1) $x = 0$

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

$= 0 + 2$

$\boxed{y = 2}$

$(0, 2)$

2) $x = 4$

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

$= 3 + 2$

$\boxed{y = 5}$

$(4, 5)$

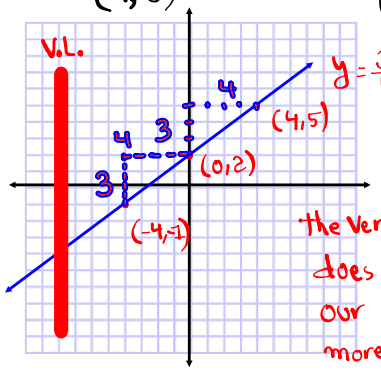
3) $x = -4$

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

$= -3 + 2$

$\boxed{y = -1}$

$(-4, -1)$



the vertical line does not cross our graph in more than one pt At any time.

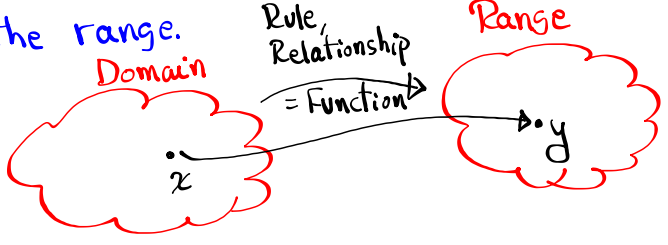
Introduction to Functions:

Functions are relationship between two groups

1) Input values ⇒ Domain ⇒ x-values

2) Output values ⇒ Range ⇒ Y- values

To have a function, for any x-value from the domain, there can be only one value in the range.



Function notation $y = f(x)$

"f of x"

$x \rightarrow$ Domain $\rightarrow$ input

$y = f(x) \rightarrow$ Range $\rightarrow$ output

Ex: $f(x) = \frac{3}{4}x + 2$

$f(0) = \frac{3}{4}(0) + 2 = 0 + 2 = 2 \Rightarrow (0, 2)$

$f(4) = \frac{3}{4}(4) + 2 = 3 + 2 = 5 \Rightarrow (4, 5)$

$f(-4) = \frac{3}{4}(-4) + 2 = -3 + 2 = -1 \Rightarrow (-4, -1)$

Given $f(x) = x^2 - 4$

1) $f(0)$

$= 0^2 - 4$

$= 0 - 4$

$= \boxed{-4}$

$(0, -4)$

2) $f(2)$

$= 2^2 - 4$

$= 4 - 4$

$= \boxed{0}$

$(2, 0)$

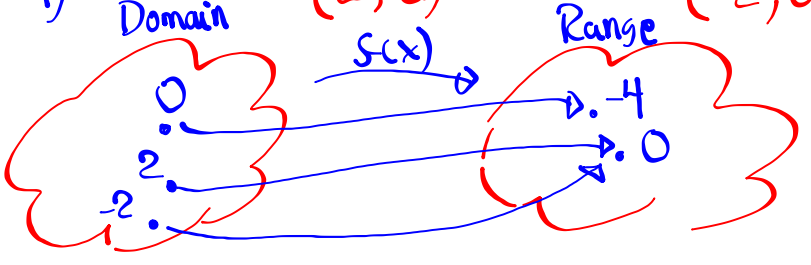
3) $f(-2)$

$= (-2)^2 - 4$

$= 4 - 4$

$= \boxed{0}$

$(-2, 0)$



$f(x) = |x + 2| - 2$

1) $f(0)$
$= |0 + 2| - 2$
$= |2| - 2 = 2 - 2 = \boxed{0}$
$(0, 0)$

2) $f(-2)$
$= |-2 + 2| - 2$
$= |0| - 2$
$= 0 - 2 = \boxed{-2}$
$(-2, -2)$

3) $f(-4)$
$= |-4 + 2| - 2$
$= |-2| - 2$
$= 2 - 2$
$= \boxed{0}$
$(-4, 0)$

4) $f(-6)$
$= |-6 + 2| - 2$
$= |-4| - 2$
$= 4 - 2 = \boxed{2}$
$(-6, 2)$

Given $f(x) = \dfrac{x^2 - 4}{x - 2}$, Find

$\dfrac{\text{Zero}}{\text{Non Zero}} = \text{Zero}$

$\dfrac{\text{Non Zero}}{\text{Zero}} = \text{Undefined}$

$\dfrac{\text{Zero}}{\text{Zero}}$ Indeterminate

1) $f(0) = \dfrac{0^2 - 4}{0 - 2}$
$= \dfrac{-4}{-2} = \boxed{2}$

2) $f(-2) = \dfrac{(-2)^2 - 4}{-2 - 2} = \dfrac{4 - 4}{-4}$
$= \dfrac{0}{-4} = \boxed{0}$

3) $f(1)$
$= \dfrac{1^2 - 4}{1 - 2}$
$= \dfrac{1 - 4}{-1} = \dfrac{-3}{-1} = \boxed{3}$

4) $f(2) = \dfrac{2^2 - 4}{2 - 2}$
$= \dfrac{4 - 4}{0}$
$= \dfrac{0}{0}$

Special Functions

1) Constant Function $f(x) = b$

2) Linear Function $f(x) = mx + b$

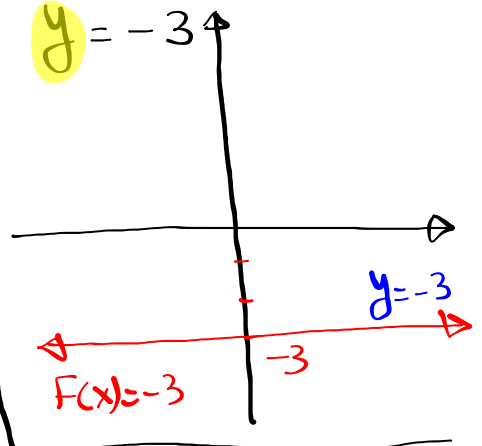
3) Square Function $f(x) = x^2$

$f(x) = 4 \iff y = 4 \Rightarrow$ Horizontal line

Constant Function

Graph $f(x) = -3 \iff y = -3$

Constant Function



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

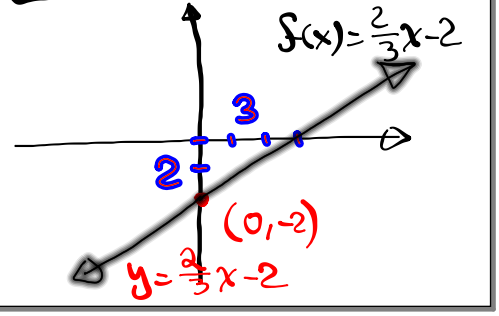
Linear Function

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

Slope-Int. form

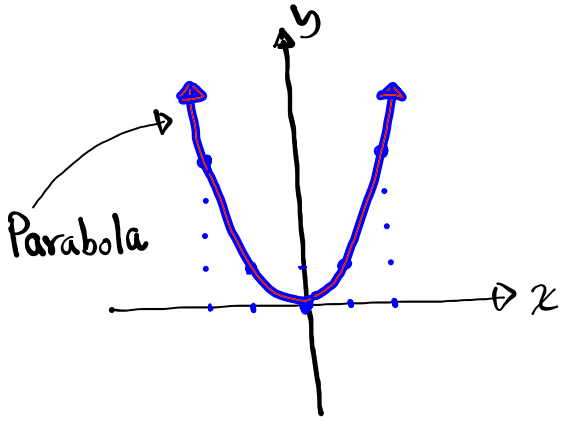
y-Int $(0,-2)$

Slope $m = \frac{2}{3}$

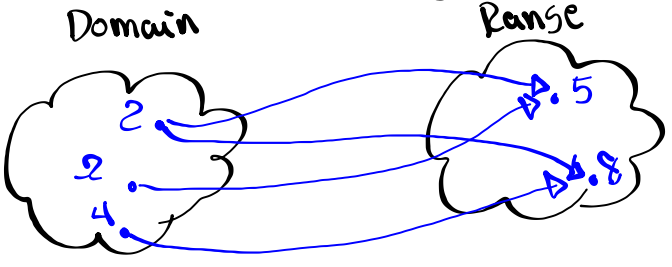


Complete the chart below for $f(x) = x^2$. Then use the chart to draw $f(x)$.

x	y	
0	0	origin
1	1	
-1	1	
2	4	
-2	4	



Consider the drawing below:



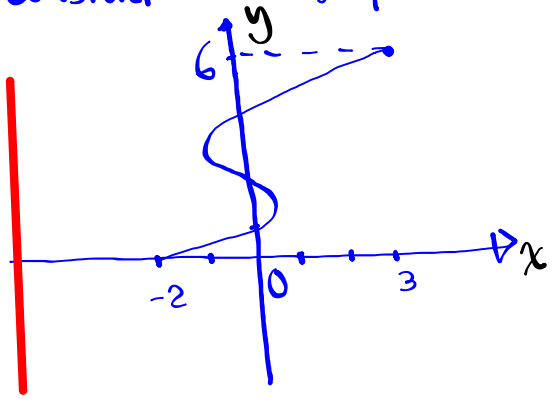
1) Express using ordered-pairs.

$(2,5)$, $(2,8)$, $(-2,5)$, $(4,8)$

2) Are these forming a function? Explain.

Not a function $(2,5)$ & $(2,8)$ Same x Different y

Consider the graph below



1) Domain: $[-2, 3]$

2) Range: $[0, 6]$

3) Is this a graph of a function? Explain

Not a function, By vertical line test.

Class QZ 3

Portrait style only.

1) Graph

$2x - 5y = -10$

by intercept Method.

2) Graph

$y = \frac{-5}{2}x - 2$ using Slope-Int. method