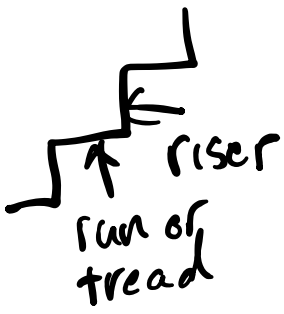
8/30 Line Review function intro!

Recall:

* $m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$



* point-slope formula:

$y - y_1 = m(x - x_1)$ with m = slope and (x_1, y_1) point on line

* slope intercept form

$$y = mx + b$$

m = slope

$(0, b)$ = y-intercept

Ex Find an equation of a line passing through the points $(4, -8)$ and $(8, 6)$

(x_1, y_1) (x_2, y_2)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - (-8)}{8 - 4}$$

$$= \frac{6+8}{4} = \frac{14}{4} = \frac{7}{2} = m$$

Use the point-slope formula $y - y_1 = m(x - x_1)$

$$y - (-8) = \frac{7}{2}(x - 4)$$

Solve so y is on one side

$$y+8=\frac{7}{2}(x-4)$$

$$-8 \qquad\qquad -8$$

$$y=\frac{7}{2}(x-4)-8$$

$$y=\frac{7}{2}x-\frac{7\cdot 4}{2}-8$$

$$y=\frac{7}{2}x-14-8$$

$$\boxed{y=\frac{7}{2}x-22}$$

$m=\frac{7}{2}$

y-intercept $(0,-22)$

Ex Find the slope, y-intercept and graph

$\boxed{4x+2y=2}$ → standard form

$Ax+By=C$

$A,B,C \in \mathbb{R}$

"in the set of real #'s"

Rewrite this so it has slope-intercept form "$y=mx+b$"

$$4x+2y=2$$

$$-4x \qquad\qquad -4x$$

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

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

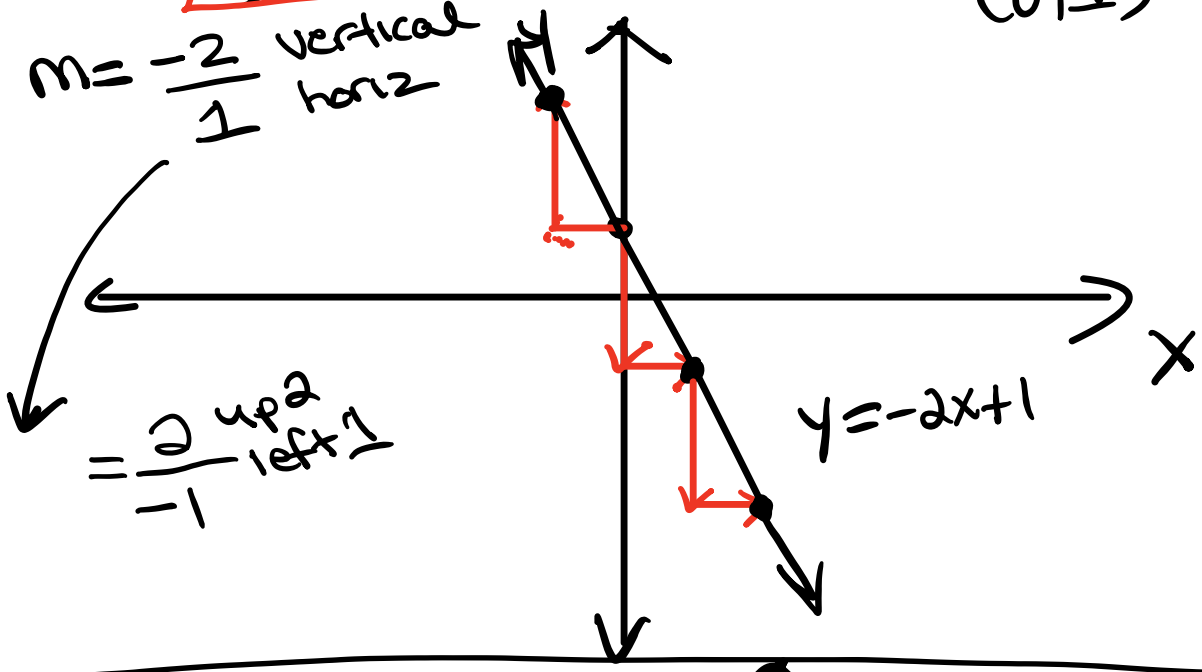
$y = -2x + 1$

$m = -2$

y-intercept $(0, 1)$

$m = \frac{-2}{1}$ vertical / horiz

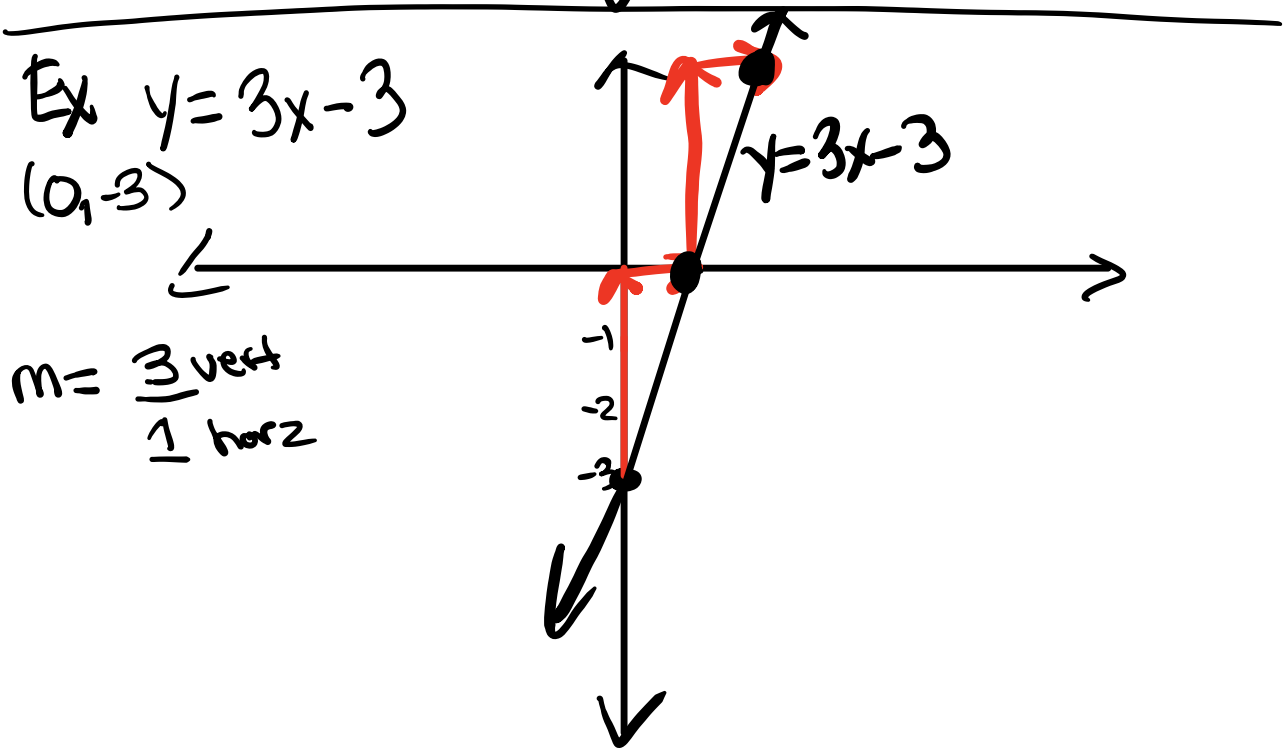
$= \frac{2}{-1}$ up 2 / left 1



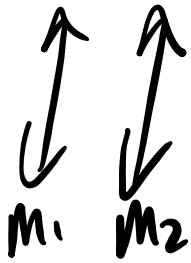
Ex $y = 3x - 3$

$(0, -3)$

$m = \frac{3}{1}$ vert / horiz

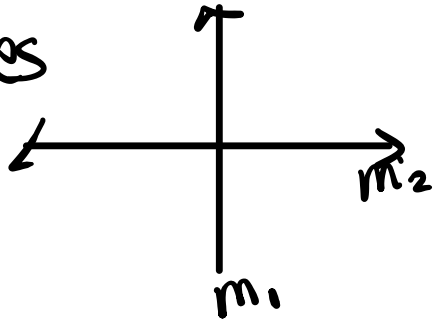


Recall: parallel lines



$m_1 = m_2$

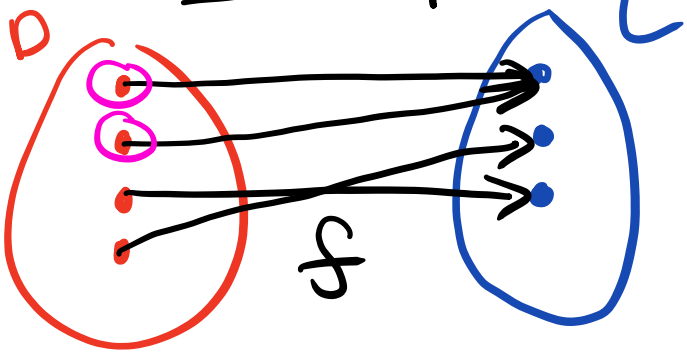
perpendicular lines



$m_1 = \frac{-1}{m_2}$

Functions

Def: A function f consists of two sets D (domain, inputs) and C (codomain, outputs) and an assignment which assigns to each input exactly one output.

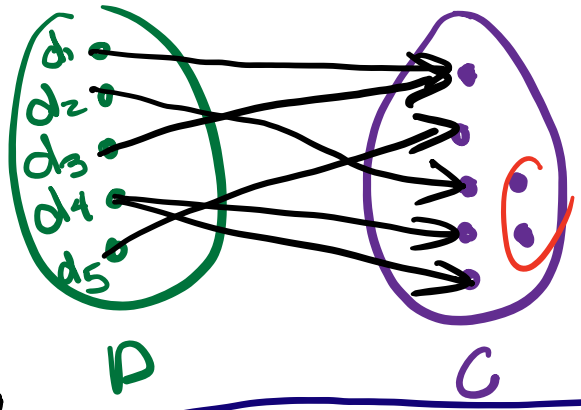


is f a function

a is not

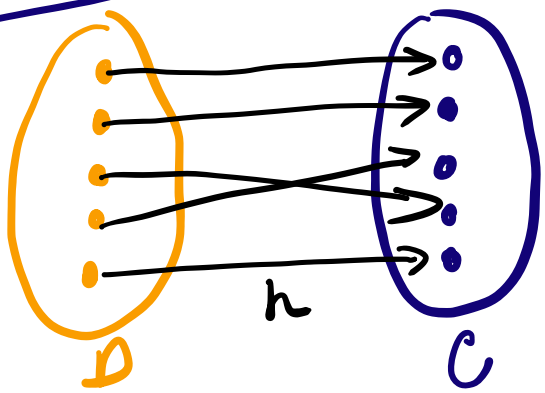
g is not a function!

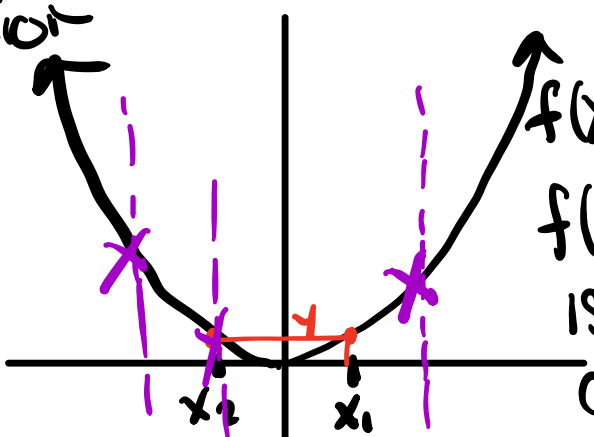
d_4 gets sent to 2 outputs!



Is g a function?

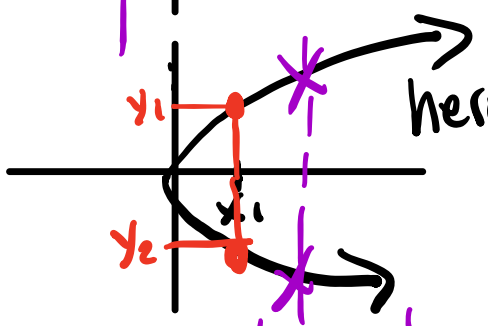
h is an example of a 1-1 "one-to-one" function





$f(x_1)=f(x_2)=y$ is a graph of a function

This is not a graph of a function



here for x_1 we get 2 y values!

does not pass the

vertical "line test"!

$f(x) = y$ — output

input

function notation

" $f(1) = 2$ "

Challenge: Consider the equation

$$x^2 + y^2 = 25$$

Does this equation define y as a function of x?

(outputs) (inputs)

try solving for y