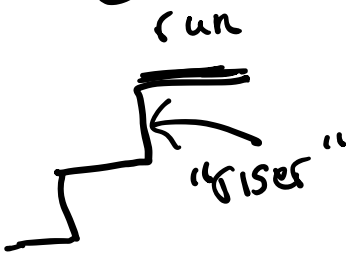
8/30 Lines Review + Functions



Recall: slope of a line

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

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

need: m, (x_1, y_1)

Slope-intercept form: $y = mx + b$

m, $(0, b)$ ≈ y-intercept

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

(x_1, y_1) (x_2, y_2)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - (-8)}{8 - 4} = \frac{6 + 8}{8 - 4} = \frac{14}{4} = m$$

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

$$y - (-8) = \frac{14}{4}(x - 4)$$

Rewrite this so it is in "$y = mx + b$" form

$$y + 8 = \frac{14}{4}(x - 4)$$

$$y = \frac{14}{4}(x-4) - 8$$

$$y = \frac{14}{4}x - \frac{14 \cdot 4}{4} - 8$$

$$y = \frac{14}{4}x - 14 - 8$$

$$\boxed{y = \frac{14}{4}x - 22}$$

solution!

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

solution!

Ex: Find the slope the y-intercept & graph

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

→ is in "standard form"

$Ax + By = C$

$A, B + C$

$\in \mathbb{R}$

(in the set of real #'s)

Rewrite this in slope-intercept form!

$4x+2y=2$

$-4x \qquad -4x$

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

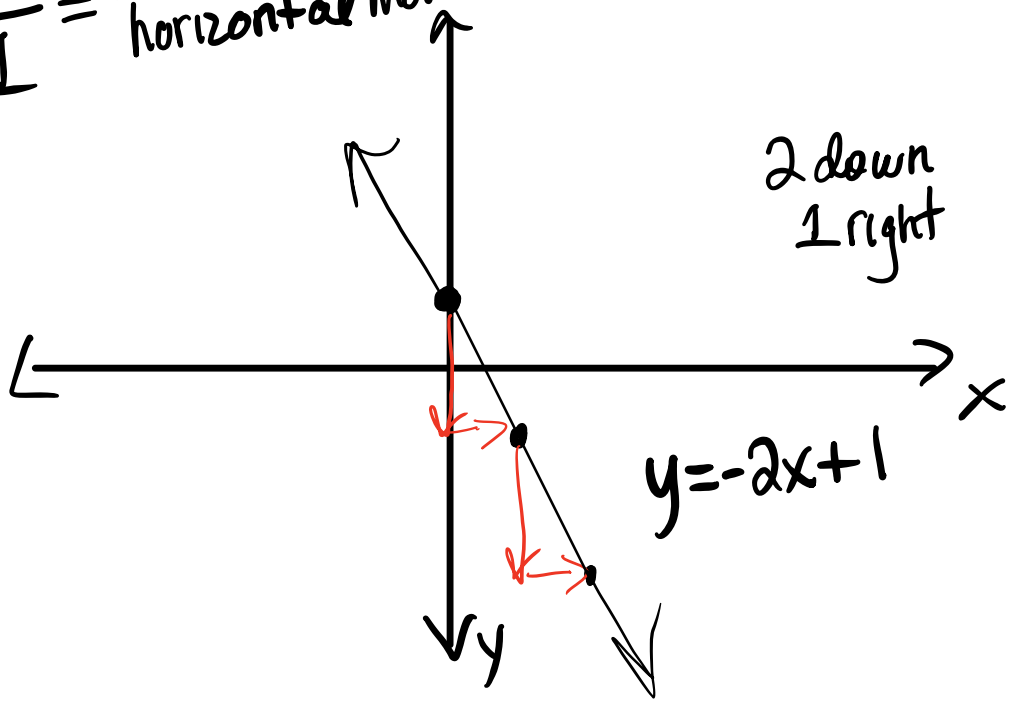
$$y = -\frac{4}{2}x + \frac{2}{2} \rightarrow y = -2x+1$$

(m = -2, b = 1)

We see that $m=-2$ and the y-intercept $(0,1)$ = b

$y=-2x+1$

$$m = \frac{-2}{1} = \frac{\text{vertical moves}}{\text{horizontal moves}}$$

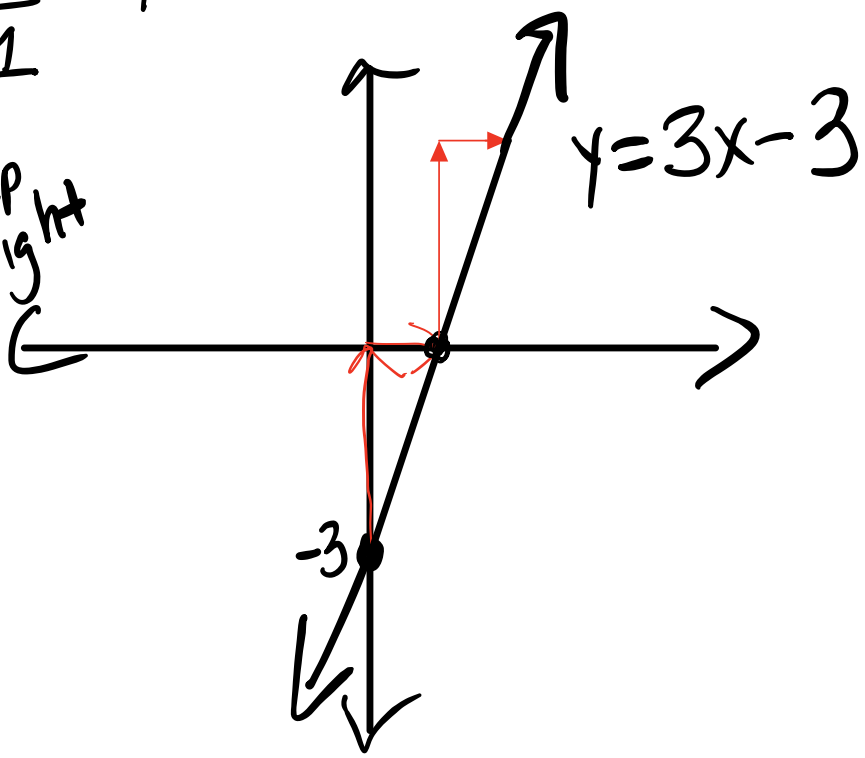


$y = 3x - 3$

$m = \frac{3}{1}$ y-intercept $(0, -3)$

↑ 3 up

→ 1 right

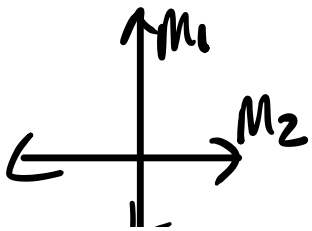


Reminder: Parallel lines:

Same slope!

$m_1 = m_2$

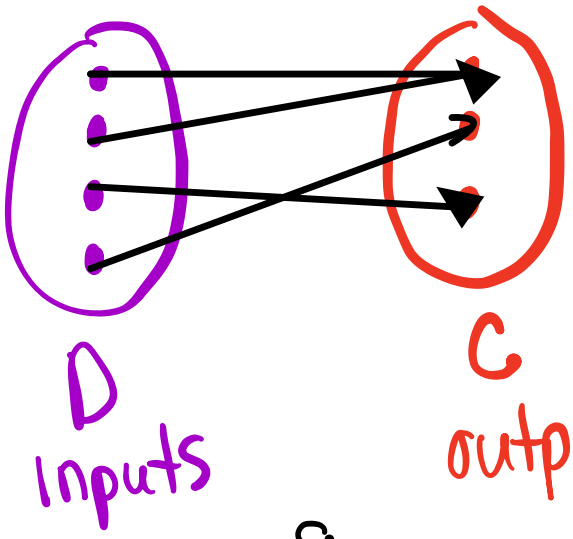
Perpendicular:



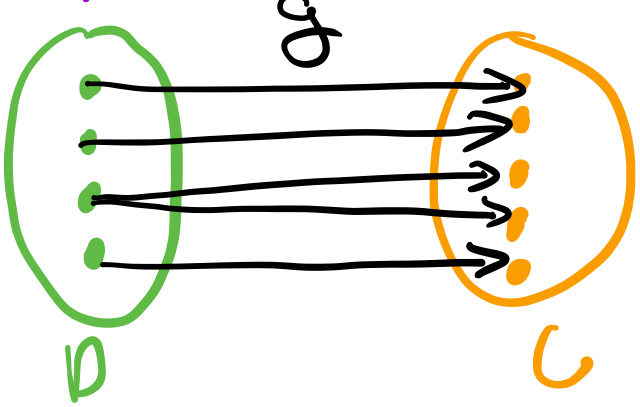
$m_1 = -\frac{1}{m_2}$

Def: A function f consists of 2 sets D (domain or inputs) and C (codomain or outputs) and an assignment that assigns to each input exactly one output

Is this a function?



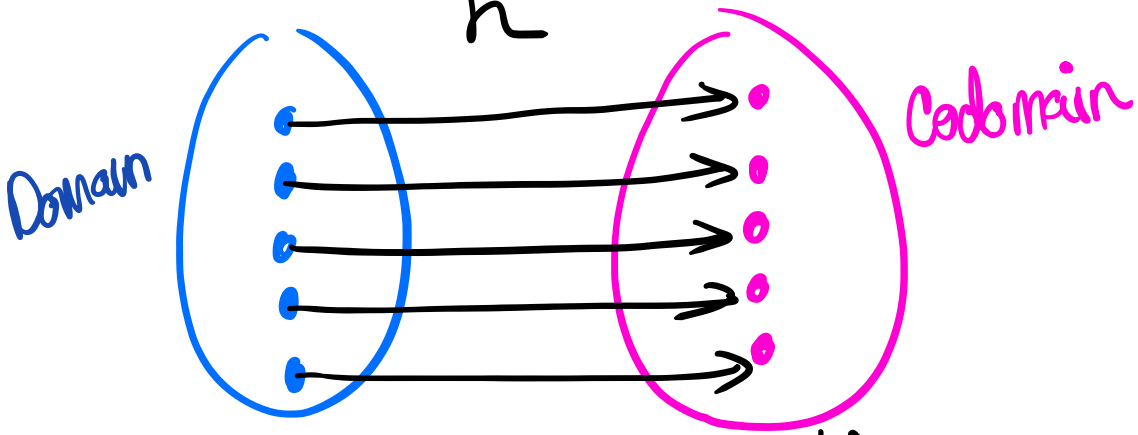
Notice that each input has exactly one output so this is a function!



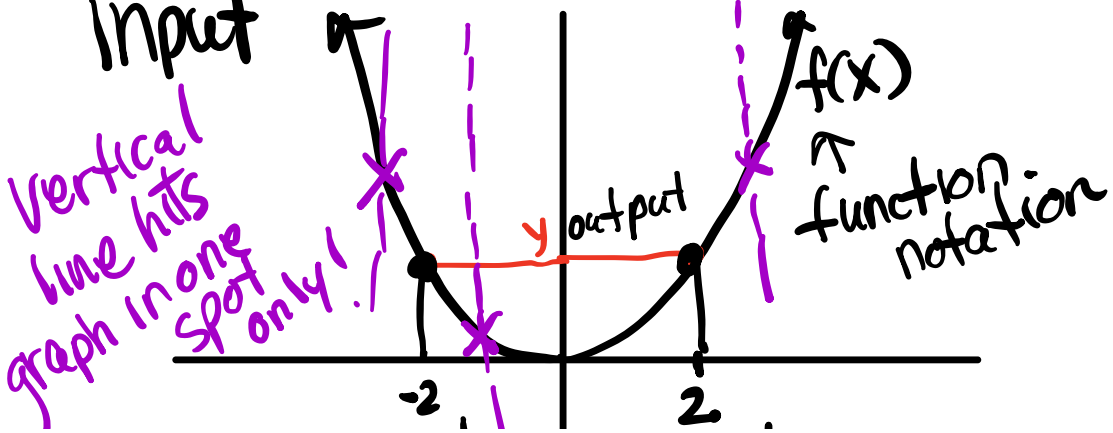
Is g a function?

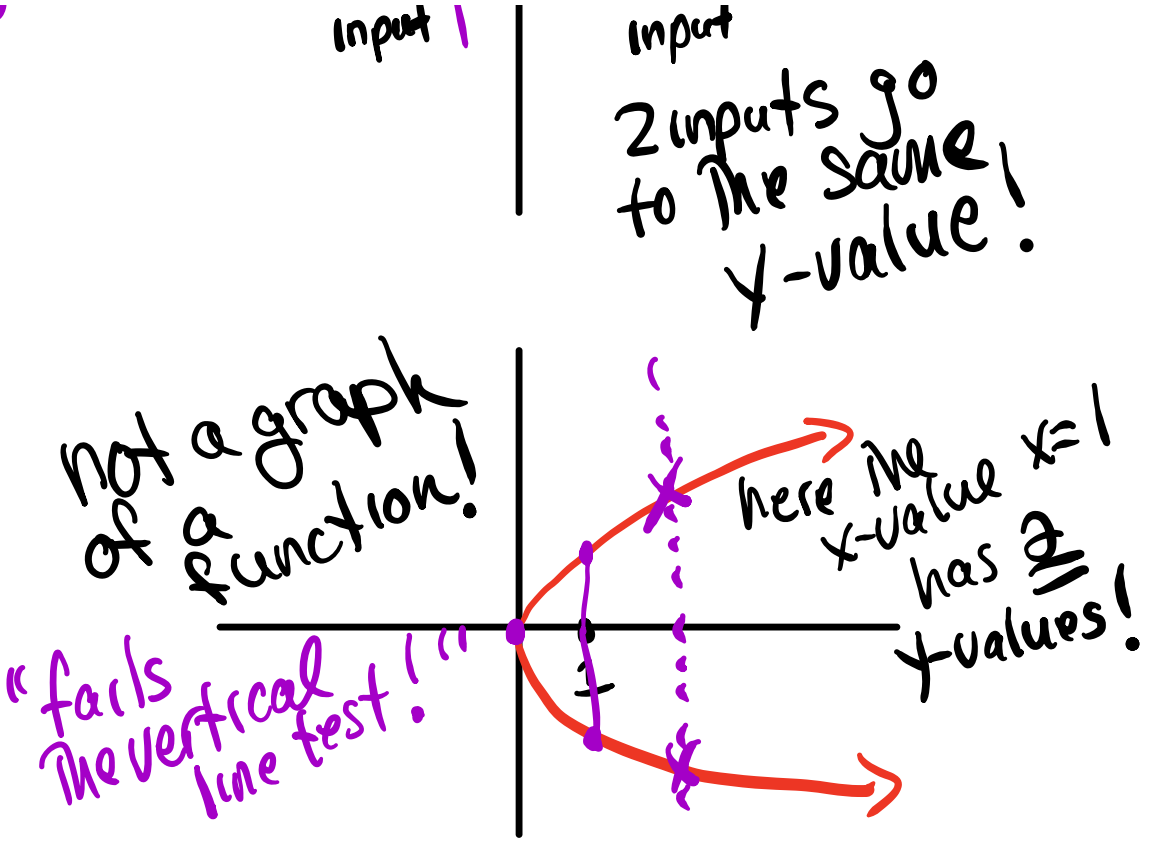
No! g is not a function because the third input goes to 2 outputs!!

h



h is a one-to-one function where every input gets assigned to exactly one output and every output comes from one input




input
input
2 inputs go to the same y-value!
not a graph of a function!
here the x-value x=1 has 2 y-values!
1
"fails the vertical line test!"

Ex $y = x^2 +$