8/23

Wednesday, August 23, 2017 10:53 AM

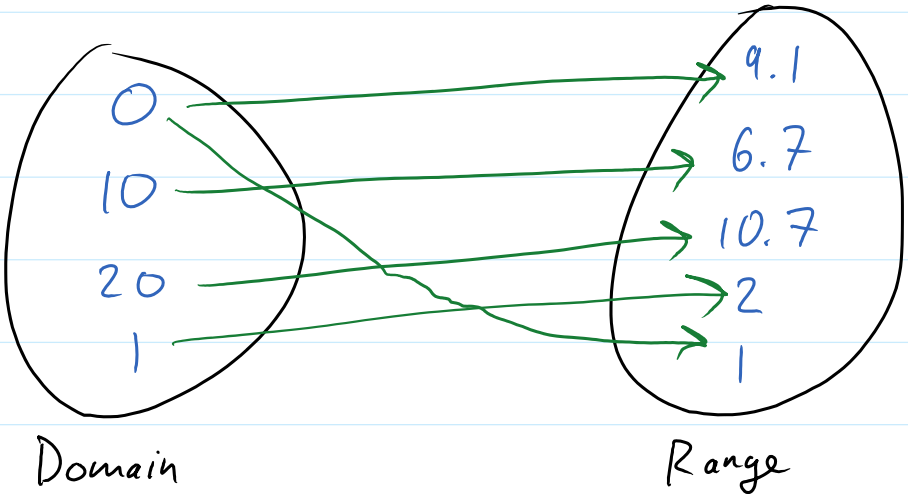
Section 2.1

Definition: A relation is any set of ordered pairs. The set of all first components of the ordered pairs is called the domain of the relation and the set of all second comp. of the pairs is called the range.

Ex: $\{(0, 9.1), (10, 6.7), (20, 10.7), (1, 2), (0, 1)\}$

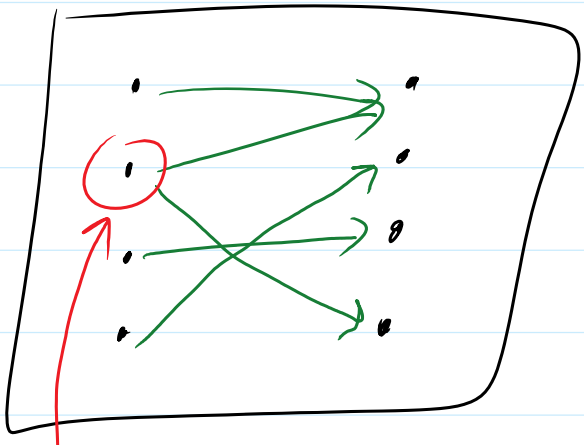
Domain: $\{0, 10, 20, 1\}$

Range: $\{9.1, 6.7, 10.7, 2, 1\}$

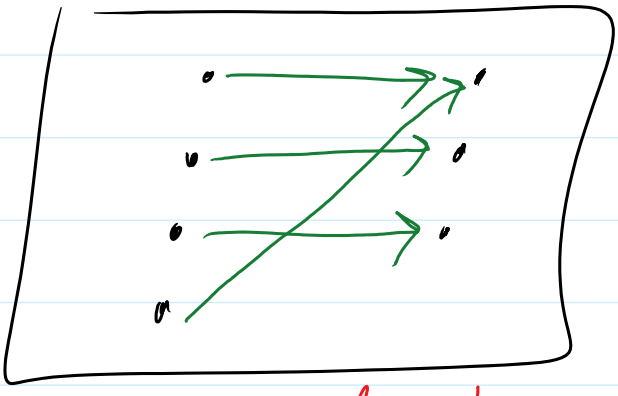


Function is a relation where each element in the domain has at most one outgoing arrow.

in the domain has at most one outgoing arrow.



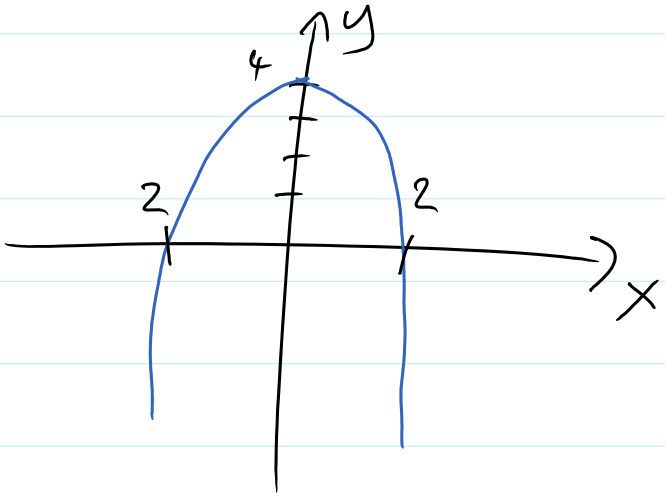
not a function



is a function

Ex:

$$x^2+y=4$$
$$-x^2 \qquad -x^2$$
$$y=4-x^2$$



is a function.

Domain: $(-\infty, \infty)$

Range: $(-\infty, 4]$

$0=4-x^2=(2-x)(2+x)$

$2+x=0$ $\quad \boxed{x=-2}$

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

Ex: $x^2+y^2=4$ ← not a function b/c

$$-x^2 \qquad -x^2$$
$$y^2=4-x^2$$

$\sqrt{y^2}=|y|$

$\sqrt{(-2)^2}=\sqrt{4}=2$

$y^2 = 4 - x^2$

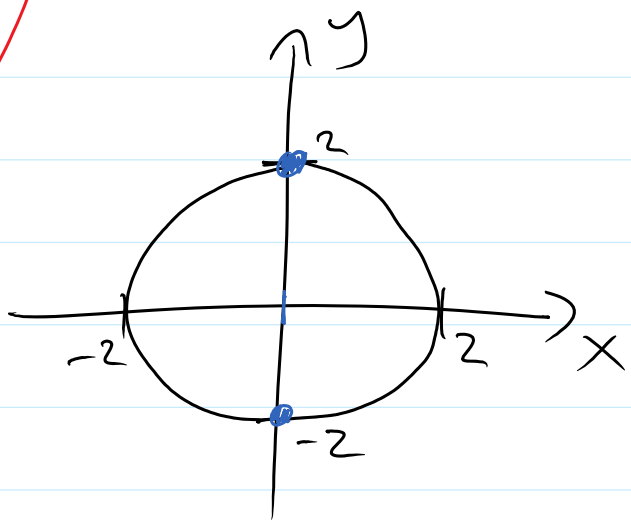
$\sqrt{y^2} = \sqrt{4-x^2}$

$|y| = \sqrt{4-x^2}$

$y = \pm\sqrt{4-x^2}$

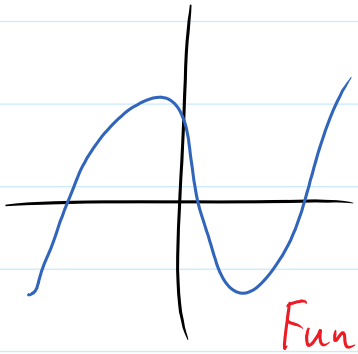
$\sqrt{(-2)^2} = \sqrt{4} = 2$

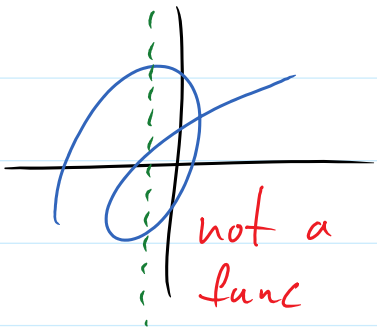
$(\sqrt{x})^2 = x$

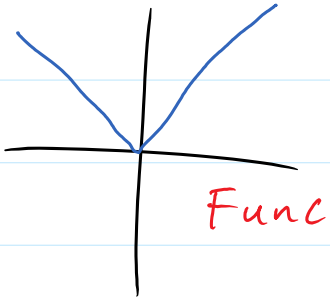


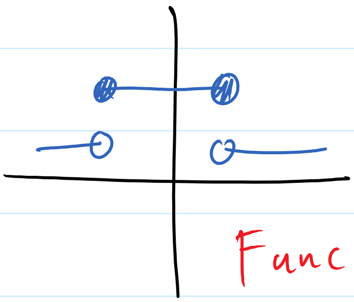
Vertical line test

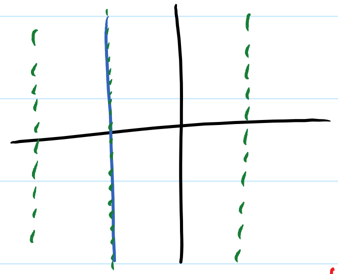
given a graph, the graph represents a func. if any vertical line crosses the graph at at most one point.


Func

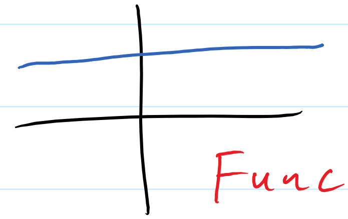

not a func


Func





$x=-3$ not a func



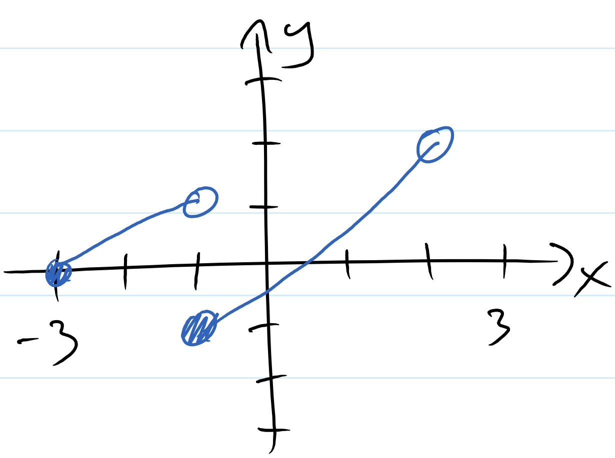
Ex:

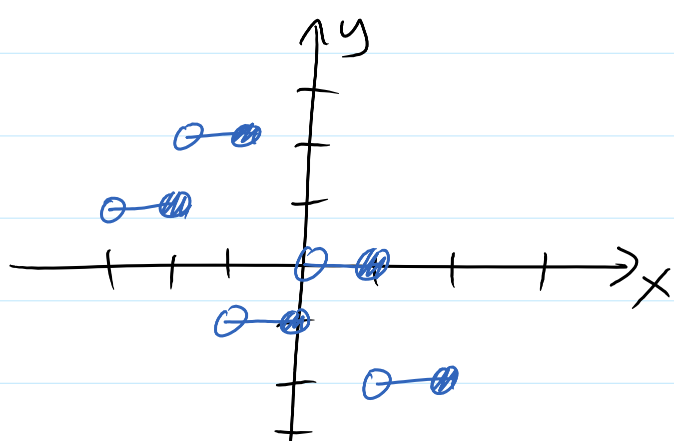
$f(x) = x^2 + 3x + 5$

$f(2) = 2^2 + 3\cdot 2 + 5 = 4 + 6 + 5 = \boxed{15}$

$f(x+3) = (x+3)^2 + 3(x+3) + 5 = x^2 + 2x\cdot 3 + 9 + 3x + 9 + 5$
$= \boxed{x^2 + 9x + 23}$

$f(-x) = (-x)^2 + 3(-x) + 5 = \boxed{x^2 - 3x + 5}$





D: $[-3, 2) = \{x \mid -3 \le x < 2\}$ D: $(-3, 2]$

R: $[-1, 2) = \{x \mid -1 \le x < 2\}$ R: ~~$[-2, 2]$~~ only integers

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D: $(-2, 2]$

R: ~~$[-2, 2]$~~ only integers

$\{-2, -1, 0, 1, 2\}$

$\{x \mid x = -2, x = -1, x = 0, x = 1, x = 2\}$

Review

Linear function

$f(x) = mx + b$ or $y = mx + b$

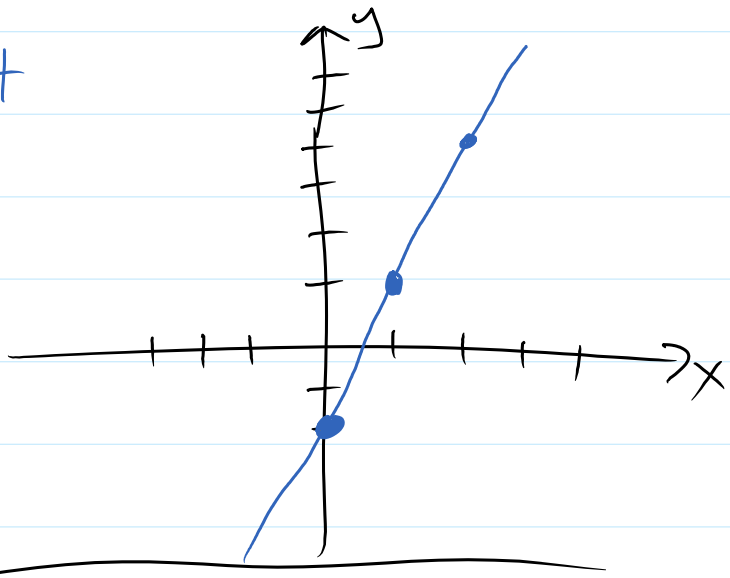
m ... slope

b ... y-intercept

$y = 3x - 2$

$m = 3$

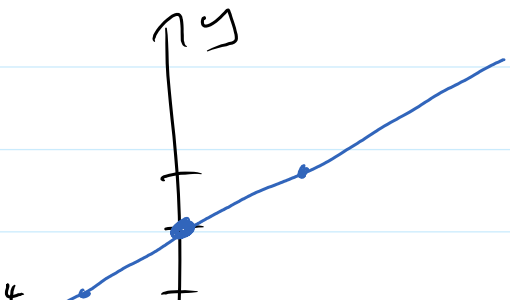
$b = -2$



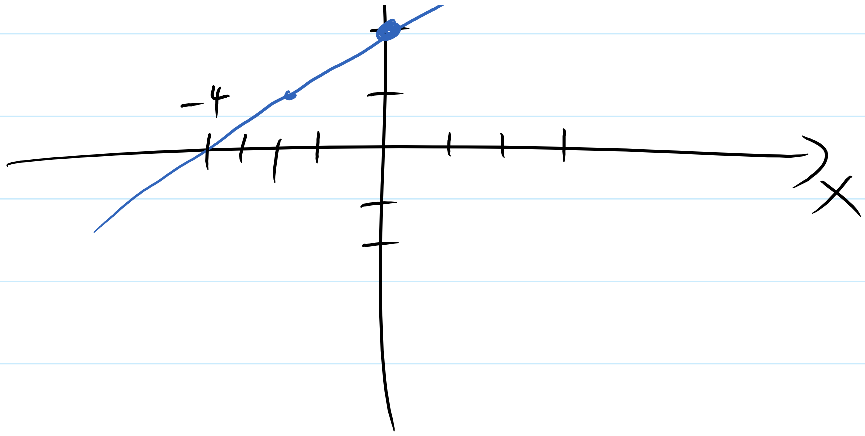
$x = 2y - 4$

$2y = x + 4$

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



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



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

$b = 2$

x-int: $(-4, 0)$

y-int: $(0, 2)$

$f(x) = \frac{4}{2x}$ find the diff. quotient.

$$\frac{f(x+h) - f(x)}{h} = \frac{\frac{x}{x} \cdot \frac{4}{2(x+h)} - \frac{4}{2x} \cdot \frac{x+h}{x+h}}{h}$$

LCM$[2(x+h), 2x]$
$= 2x(x+h)$

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

$$= \frac{\frac{4x - (4x + 4h)}{2x(x+h)}}{h} = \frac{\frac{\cancel{4x} - \cancel{4x} - 4h}{2x(x+h)}}{\frac{h}{1}}$$

$$= \frac{-4\cancel{h}}{2x(x+h)} \cdot \frac{1}{\cancel{h}} = \frac{-4}{2x(x+h)}$$