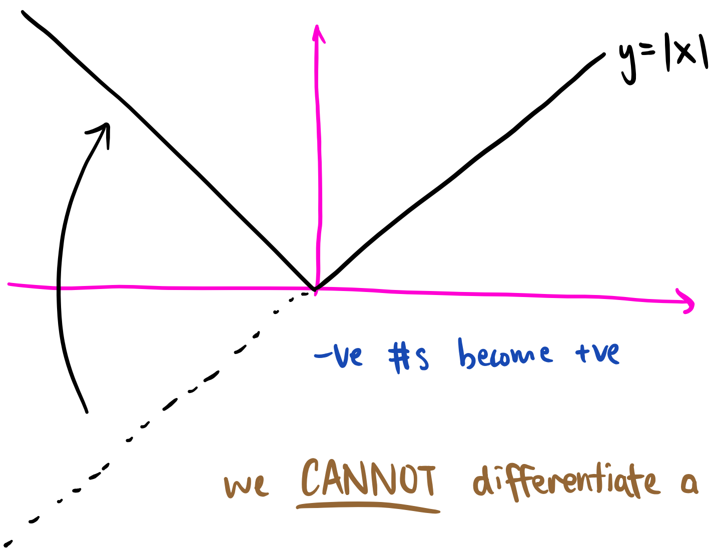
Functions & Graphs

The **modulus** function $|\square|$

$|x| = |-x| = x \quad (x > 0)$ Returns a positive #
(Returns the magnitude of #)



we **CANNOT** differentiate a modulus function

Solving Modulus eq^n:

$|x-6| = 18 \longrightarrow$ 2 options:

$x-6 = 18$ **OR** $x-6 = -18$

$x = 24$ $\qquad$ $x = -12$

$x = -12, 24$

But wait!

$|3x+4| = x$

$3x+4 = x$ $\qquad$ $3x+4 = -x$

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

$x = -2$ $\qquad$ $x = -1$

Since $|3x+4| > x$,

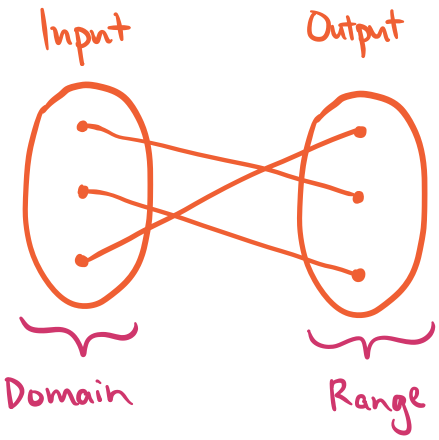
$x = -2$ & $x = -1$

are inadmissable.

That's it!

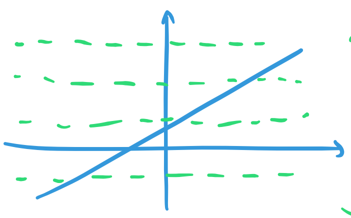
Functions & Mapping

Mapping: A rule which transforms one set of numbers to another set

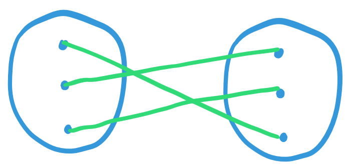


Types of mapping

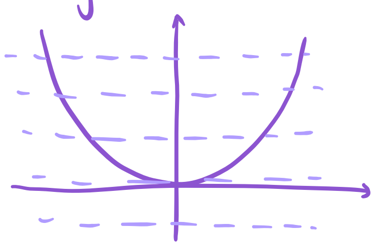
One-to-one



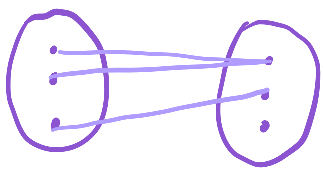
horizontal line cuts only once



Many-to-one

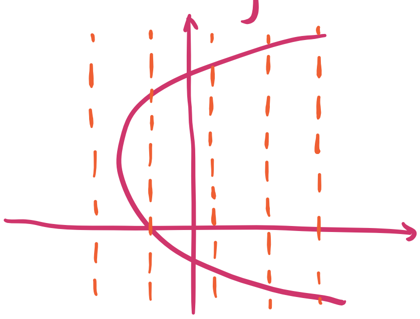


horizontal line cuts multiple times

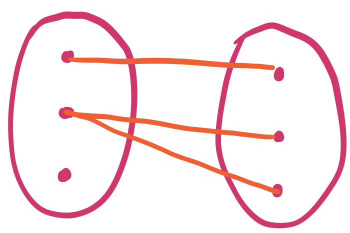


Only these are functions

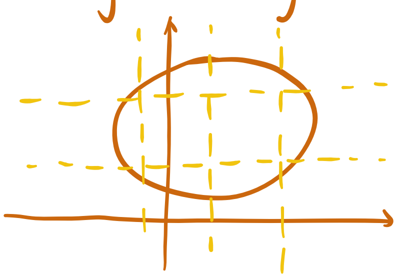
One-to-many



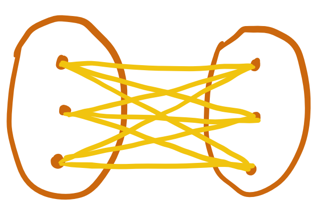
vertical line cuts multiple times



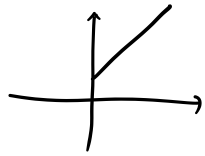
Many-to-Many



Vertical & horizontal lines cut multiple times

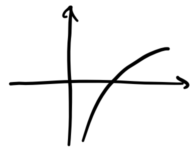


$f : x \underbrace{\longmapsto}_{\text{"mapped to"}} 3x+2 \qquad \underbrace{x > 0}_{\text{domain}}$



A function is defined as the mapping AND the domain.

$f : x \longmapsto 7\log x \qquad \underbrace{x \in \mathbb{R},\ x > 0}_{\text{rewrite as } x \in \mathbb{R}^+}$

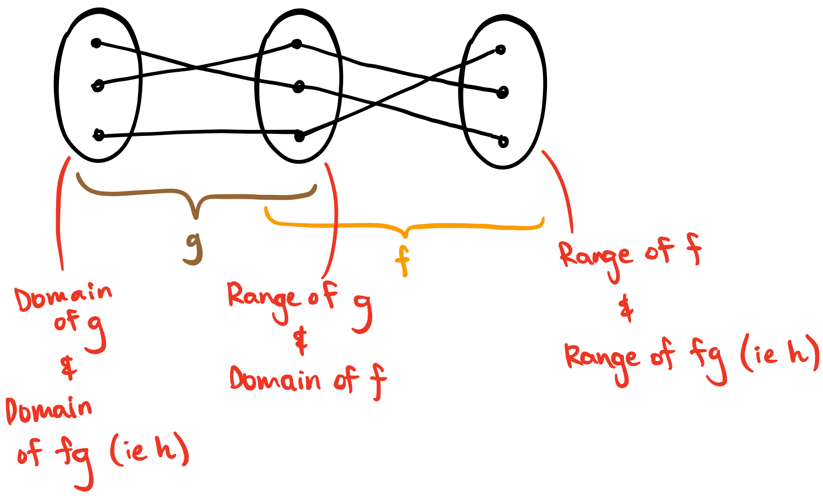


Composite Functions

"To be made up / many parts"

Try not to use this notation.

$h(x) = f(g(x))$ or $f \circ g(x)$ or $fg(x)$



When can a composite function be formed?

Consider $f(x) = \ln(x)$, $x \in \mathbb{R}^+$

$g(x) = 2x+3$, $x \in \mathbb{R}$

Can $fg(x)$ be formed?

Can $gf(x)$ be formed?

Ex 2C (p.34)

① $p(x) = 1-3x$ $q(x) = \frac{x}{4}$ $r(x) = (x-2)^2$

a) $q(-8) = -2$ $\therefore pq(-8) = p(-2) = 1+6 = 7$

b) $r(5) = 9$ $\therefore qr(5) = q(9) = 9/4$

c) $q(6) = 3/2$ $\therefore rq(6) = r(3/2) = 1/4$

More Transformations!

$|f(x)|$ $\Rightarrow$ reflect anything below x-axis to above x-axis

$f(|x|)$ $\Rightarrow$ only plot positive values ~~of~~ x, then reflect to left side