Section 8.1 Functions

A relation pairs an x-coordinate with a y-coordinate. Any set of ordered pairs is a relation.

$\{(5,6), (8,3), (6,2)\}$ is a relation.

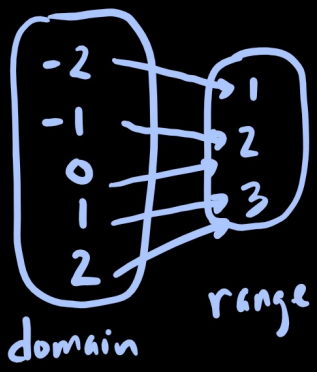
The set $\{5,8,6\}$ is called the domain (set of x's)

The set $\{6,3,2\}$ is called the range (set of y's)

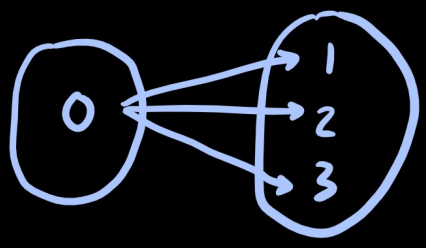
Some relations are functions. A function assigns each domain element exactly one range element.

The relation above is a function.

MAPPING DIAGRAMS



is a function



is not a function

ex: Is this a function? List domain and range.

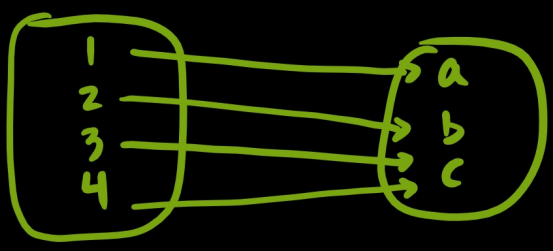
a) $\{(5,7), (7,9), (9,11), (7,13)\}$

not a function

$D = \{5,7,9\}$

$R = \{7,9,11,13\}$

b)



is a function

$y = \frac{1}{2}x + 3$

Find y when $x = 4$

$y = \frac{1}{2} \cdot 4 + 3$

$y = 2 + 3$

$y = 5$

Function Notation

$f(x) = \frac{1}{2}x + 3$

"f of x"

$f(4) = \frac{1}{2} \cdot 4 + 3$

$= 5$

ex: a) $f(4)$ if $f(x) = 2x + 3$

$f(4) = 2 \cdot 4 + 3 = 8 + 3 = 11$

b) $g(-2)$ for $g(x) = 2x^2 - 1$

$g(-2) = 2(-2)^2 - 1 = 2 \cdot 4 - 1$

$= 8 - 1$

$= 7$

c) $h(-5)$ for $h(r) = r^3 - 2r^2 + 5$

$h(-5) = (-5)^3 - 2(-5)^2 + 5$

$= -125 - 2 \cdot 25 + 5$

$= -125 - 50 + 5$

$= -170$

d) $F(\text{Tiger})$ for $F(x) = 5x + 7$

$= 5 \cdot \text{Tiger} + 7$

$F(a+h)$ for $F(x) = 5x + 7$

$F(a+h) = 5(a+h) + 7$

$= 5a + 5h + 7$

Derivative

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$

ex:

x	$f(x)$
-2	5
-1	0
0	3
1	1
2	4

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

$R = \{5, 0, 3, 1, 4\}$

$f(-1) = 0$

$f(0) = 3$

Find x such that $f(x) = 4$. $x = 2$

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