

## WARMUP - In Notebook

If  $f(x) = 3x - 7$ , find:

$$f(0) = 3 \cdot 0 - 7 = 0 - 7 = -7$$

$$f(1) = 3 \cdot 1 - 7 = 3 - 7 = -4$$

$$f(-2) = 3(-2) - 7 = -6 - 7 = -13$$

$$f(A) = 3A - 7$$

---

## Section 8.1 Functions

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

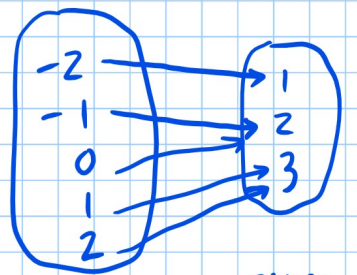
For example  $\{(5,6), (8,3), (6,2)\}$  is a relation.

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

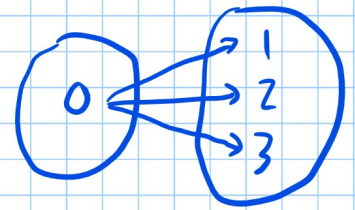
The set  $\{6, 3, 2\}$  is called the range  
(set of y's)

Some relations are functions. A function assigns each domain element to exactly one range element. Our first example is a function.

## MAPPING DIAGRAM



domain          range  
inputs        outputs  
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

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

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

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

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"

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

$$f(4) = 2 + 3$$

$$f(4) = 5$$

ex:  $f(x) = x^3 - 2x^2 + 5$

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

↓  
on calc  $(-5)^3$

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

$$= -125 - 50 + 5$$

$$= -170$$

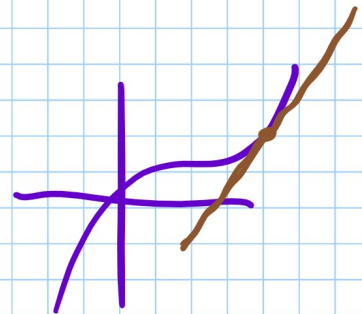
ex:  $f(a+h)$  for  $f(x) = 5x + 7$

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

$$= 5a + 5h + 7$$

Definition of Derivative

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



ex:

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

"discrete function"

Domain and range have a finite number of values  
↑  
they can be counted.

$$f(-1) = 0$$

$$f(2) = 4$$

Find x so that  $f(x) = 5$

$x = -2$

p558 - 559 3-21 multiples of 3, 30

$$\{(-7, -7), (-5, -5), (-3, -3), (0, 0)\}$$

function

$$D = \{-7, -5, -3, 0\}$$

$$R = \{-7, -5, -3, 0\}$$