

FUNCTIONS

SECTION 1.1

PG 1

OBJECTIVES:

- RECALL THE DEFINITION OF A FUNCTION, & BASIC FACTS REGARDING FUNCTIONS
- RECALL GRAPHING FUNCTIONS

DEFINITION

A **FUNCTION** IS A RULE THAT TAKES CERTAIN VALUES AS INPUTS AND ASSIGNS TO EACH INPUT EXACTLY ONE OUTPUT

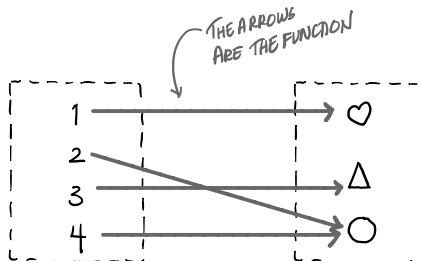
YOU CAN THINK OF A FUNCTION AS A SPECIAL MACHINE.

I FEED SOMETHING INTO THE MACHINE, (INPUT) THEN THE MACHINE MANIPULATES THIS INPUT IN SOME WAY, & THEN SPITS OUT A NEW THING (OUTPUT)

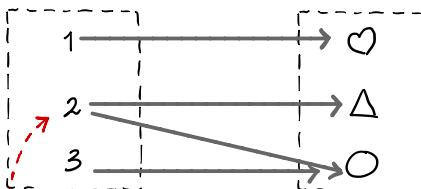


EX(S)

1



IT'S A FUNCTION



NOT A FUNCTION
(why?)

--- THE VALUE 2 IS NOT SENT TO EXACTLY ONE OUTPUT.

NOTATION

YOU'LL OFTEN SEE FUNCTIONS WRITTEN LIKE:

$$y = f(x)$$

y is the output
or dependent variable

x is the input
or independent variable

THE OUTPUT OF MY
FUNCTION DEPENDS
ON MY INPUT.

"f" is the name of the function.

DEFINITION

- THE SET OF ALL POSSIBLE INPUTS IS CALLED THE DOMAIN OF THE FUNCTION
- THE SET OF ALL POSSIBLE OUTPUTS IS CALLED THE RANGE OF THE FUNCTION

EX(S)

GO BACK TO PREVIOUS EXAMPLE $\hat{=}$ LABEL DOMAIN & RANGECONSIDER $f(x) = x^2$ DOMAIN: WHAT VALUES OF x CAN I PLUG IN? ANY!WRITE: ALL REAL #S $\in \mathbb{R} \subset (-\infty, \infty)$.RANGE: WHAT #S DO I GET AS OUTPUTS? WELL.. ONLY POSITIVE #S, AND ZERO![0, ∞)MAKE UP A FUNCTION WHOSE DOMAIN IS [0, ∞).

WHAT IS THE RANGE OF YOUR FUNCTION?

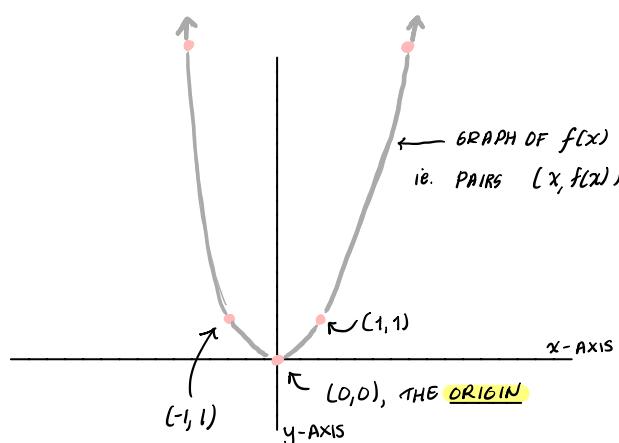
DEFINITIONTHE GRAPH OF A (REAL-VALUED) FUNCTION f WITH DOMAIN D IS:

$$\{(x, f(x)) \mid x \in D\} \subseteq \mathbb{R}^2$$

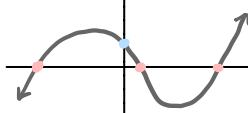
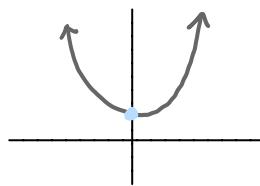
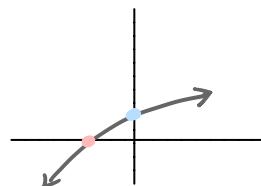
IT'S JUST THE SET OF PAIRS (input, output)

BXLET $f(x) = x^2$.

input	= x	output	= x^2
-3		$(-3) \cdot (-3) = 9$	
-1		$(-1) \cdot (-1) = 1$	
0		$0 \cdot 0 = 0$	
1		$1 \cdot 1 = 1$	
3		$3 \cdot 3 = 9$	

**DEFINITION**LET f BE A FUNCTION OF x .

- THE x -INTERCEPTS ARE THE POINTS $(x, 0)$ ON THE GRAPH
- THE y -INTERCEPT IS THE POINT $(0, f(0))$ ON THE GRAPH

■ = x -INTERCEPTS■ = y -INTERCEPTS3 x -intercepts1 y -interceptNo x -intercepts1 x -intercept1 y -intercept

- MUST A FUNCTION HAVE A y -INTERCEPT? WHY OR WHY NOT?
 - WHAT'S THE MAX # OF y -INTERCEPTS THAT A FUNCTION CAN HAVE? WHY?