

## Warm Up

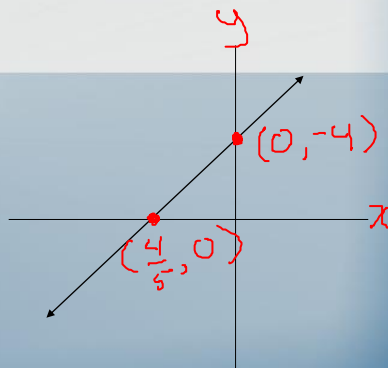
Find the zeros and initial value of:

$$y = ax + b$$

$$y = 5x - 4$$

IV:  $y = 5(0) - 4$   
 $y = -4$

Zero:  $0 = 5x - 4$   
 $\frac{4}{5} = \frac{5x}{5}$   
 $\frac{4}{5} = x$



## Lesson 20

### Properties of Functions – Cont'd

## Properties of Functions

### Sign of a Function (Positive or Negative):

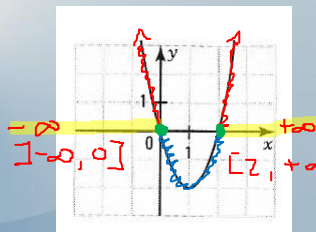
Studying the **SIGN** of a function means **FINDING THE VALUES of X** for which the function is:

**POSITIVE** (When Y is greater or equal to 0)  $f(x) \geq 0$

**NEGATIVE** (When Y is less or equal to 0)  $f(x) \leq 0$

## Properties of Functions

Ex. Find the sign of the function:

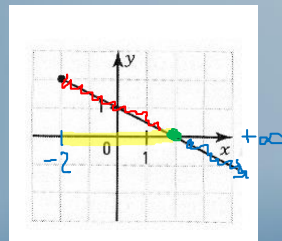


+ve

$$f(x) \geq 0 : ]-\infty, 0] \cup [2, +\infty[$$

$$f(x) \leq 0 : [0, 2]$$

-ve



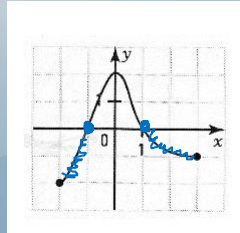
+ve

$$f(x) \geq 0 : [-2, 2]$$

$$f(x) \leq 0 : [2, +\infty[$$

## Properties of Functions

Ex. Find the sign of the function:



$$f(x) \geq 0 : [-1, 1]$$

$$f(x) \leq 0 : [-2, -1] \cup [1, 3]$$

## Properties of Functions

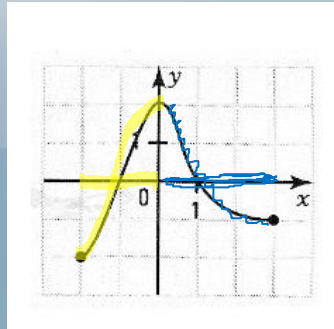
**Variation of a function** (increasing or decreasing)

**Increasing:** Value of  $x(s)$  when  $y$  is increasing  
(ie when the graph goes **up** from left to right)

**Decreasing:** Value of  $x(s)$  when  $y$  is decreasing  
(ie when the graph goes **down** from left to right)

## Properties of Functions

Ex. Find the variation of the following function:

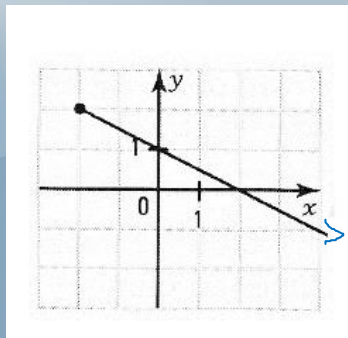


$\uparrow: [-2, 0]$

$\downarrow: [0, 3]$

## Properties of Functions

Ex. Find the variation of the following function:

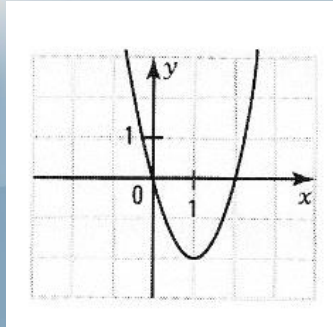


$\uparrow: \emptyset$

$\downarrow: [-2, +\infty[$

## *Properties of Functions*

**Ex.** Find the variation of the following function:



↑:  $[1, +\infty[$

↓:  $] -\infty, 1]$

## *Properties of Functions*

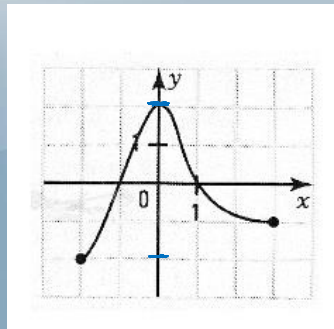
**Extrema** (Maximum or Minimum)

**Maximum:** The greatest value of  $y(s)$ .

**Minimum:** The lowest value of  $y(s)$ .

## Properties of Functions

Ex. Find the extrema of the following function:

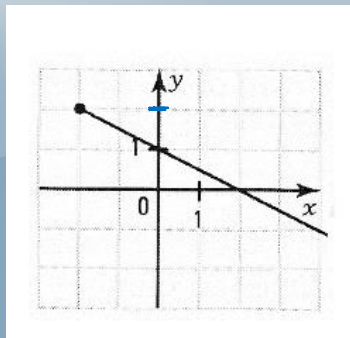


Max: 2

Min: -2

## Properties of Functions

Ex. Find the extrema of the following function:

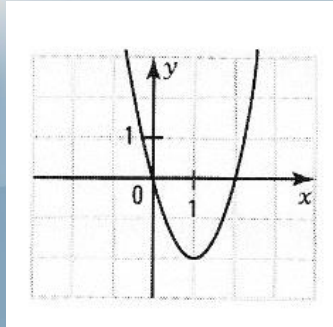


Max: 2

Min:  $\emptyset$

## Properties of Functions

Ex. Find the extrema of the following function:

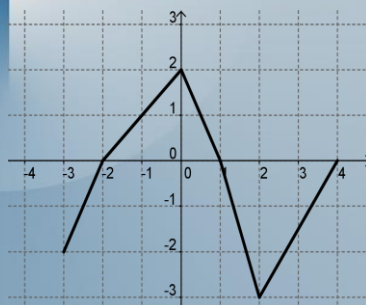


Max:  $\emptyset$

Min: -2

## Properties of Functions

Ex. Find the properties of the following function:



$$\text{dom } f = [-3, 4]$$

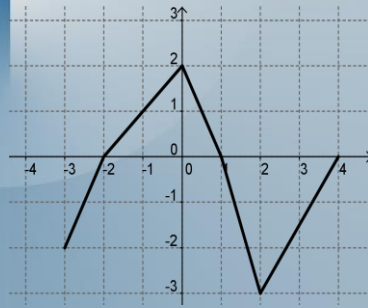
$$\text{ran } f = [-3, 2]$$

$$\text{Zeros: } \{-2, 1, 4\}$$

$$\text{IV: } f(0) = 2$$

## Properties of Functions

Ex. Find the properties of the following function:



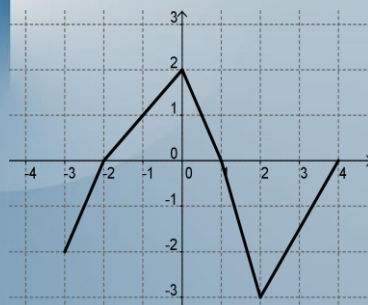
Sign:

$$f(x) \geq 0 \text{ if } x \in [-2, 1]$$

$$f(x) \leq 0 \text{ if } x \in [-3, -2] \cup [1, 4]$$

## Properties of Functions

Ex. Find the properties of the following function:



Variation:

$$f \text{ is increasing if } x \in [-3, 0] \cup [2, 4]$$

$$f \text{ is decreasing if } x \in [0, 2]$$

$$\text{Max/Min: } \begin{aligned} \max f &= 2 \\ \min f &= -3 \end{aligned}$$



# Homework

## Textbook #2

P. 10 #3 & 4

P. 11 #5 & 6