

Warm Up

Find the zeros and initial value of:

$$f(x) = 3(x-4)^2 - 3$$

Zeros: $0 = 3(x-4)^2 - 3$ (V: $y = 3(0-4)^2 - 3$)
 $3 = \frac{3(x-4)^2}{3}$ $y = 3(-4)^2 - 3$
 $\sqrt{1} = \sqrt{(x-4)^2}$ $y = 3(16) - 3$
 $\pm 1 = x - 4$ $= 48 - 3$
 $= 45$

Case 1 Case 2
 $1 = x - 4$ $-1 = x - 4$
 $x = 5$ $x = 3$

Lesson 14

Functions – Cont'd

Properties of Functions

Sign of a Function (Positive or Negative):

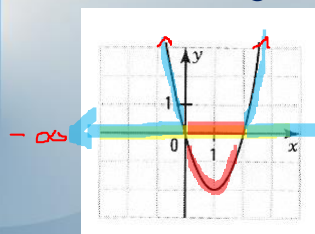
Studying the **SIGN** of a function means **FINDING THE VALUES of X** for which the function is:

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

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

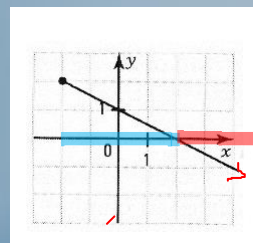
Properties of Functions

Ex. Find the sign of the function:



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

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

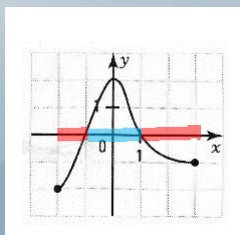


$$+ f(x) \geq 0 :]-\infty, 2[$$

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

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

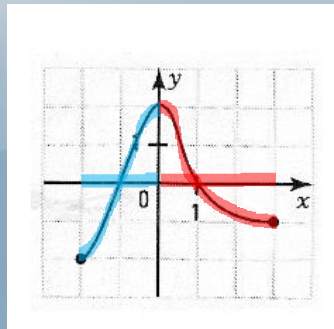
Variation of a function (increasing or decreasing)

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:

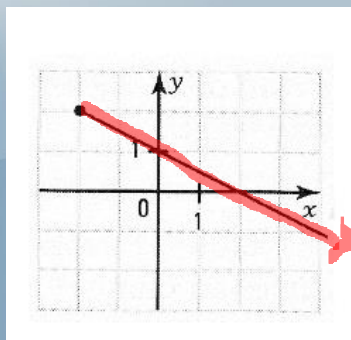


$\uparrow: [-2, 0]$

$\downarrow: [0, 3]$

Properties of Functions

Ex. Find the variation of the following function:

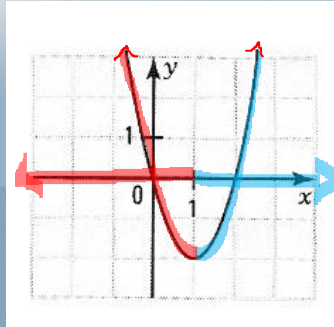


$\uparrow: \emptyset$

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

Properties of Functions

Ex. Find the variation of the following function:



$\uparrow:]-\infty, 1]$

$\downarrow: [1, +\infty[$

Properties of Functions

Extrema (Maximum or Minimum)

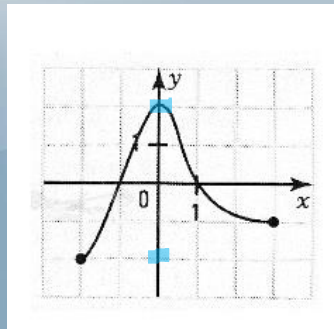
Maximum: The greatest value of $y(s)$.

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



Properties of Functions

Ex. Find the extrema of the following function:



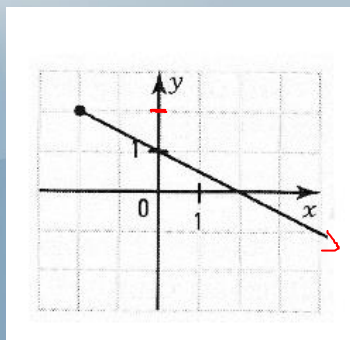
Max: 2

Min: -2

Range $[-2, 2]$

Properties of Functions

Ex. Find the extrema of the following function:

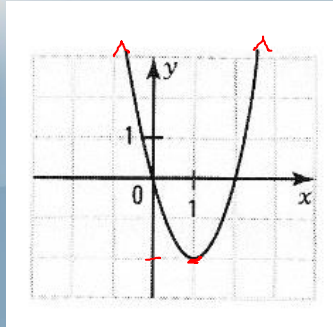


Max: 2

Min: \emptyset

Properties of Functions

Ex. Find the extrema of the following function:

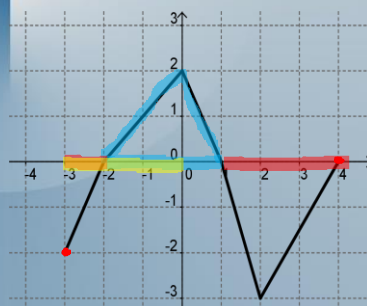


Max: \emptyset

Min: -2

Properties of Functions

Ex. Find the properties of the following function:



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

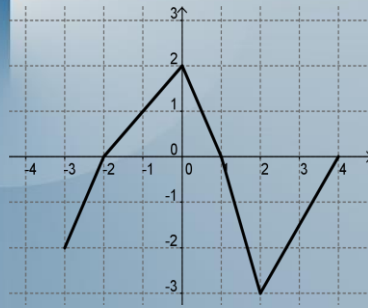
$$\text{ran } f = [-3, 2]$$

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

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

Properties of Functions

Ex. Find the properties of the following function:



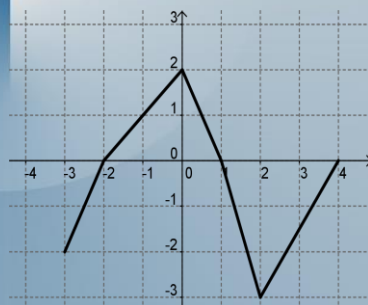
Sign:

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

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

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

Workbook

P. 54 #14 & 15

P. 56 #17

P. 58 #20

P. 71 #4 a) only