Ex $f(x) = x^2$

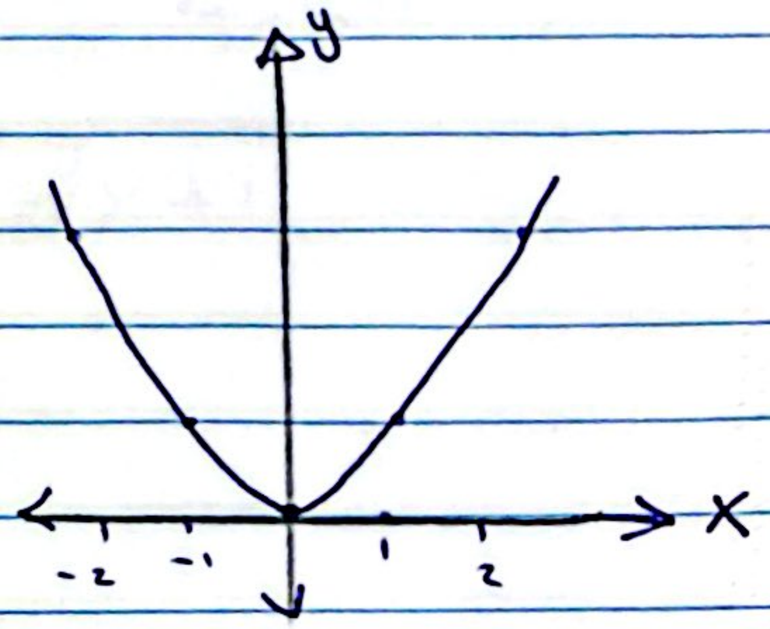
Soly This is a polynomial function, So x can be take all numbers :-

$Dy = \{x : x \in R\} = (-\infty, \infty)$

to find the range, we solve : $y = x^2 \Rightarrow x = \mp\sqrt{y}$

This is root function, so we must avoid the numbers then make the root undefined :-

x :	-3	-2	-1	0	1	2	3
y :	9	4	1	0	1	4	9



$0 \leq \sqrt{y} \Rightarrow 0 \leq y$

$Ry = \{y : y \in R : y \geq 0\}$

This function is even, because :

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

Typ of Al-Gebric Function are :-

1. Multinomial (Polynomial): is

$f(x) = a_0^n x_0 + a_1^{n-1} x_1 + a_2^{n-2} x_2 + \dots$

fo example

$f(x) = x^2 + 4x + 2$; $f(x) = \frac{1}{2}x^3 + \frac{1}{4}x^2 + \frac{1}{3}$

$y = x^5 + 2$

2. Fractional الكسرية

$$Z(x) = \frac{f(x)}{g(x)} \quad ; \quad g(x) \neq 0$$

$$f(x) = \frac{x^5 + x^4}{2x^2 + 1} \quad ; \quad f(x) = \frac{1}{x} \quad ; \quad x \neq 0$$

$$f(x) = \frac{x^2 + 4x}{5}$$

3. Root function الجذرية

$$y = \sqrt{f(x)} \quad ; \quad y = \sqrt{x^4 + 2} \quad ; \quad y = \sqrt{x+1}$$

Ex

= Find the domain to:

1. $y = \sqrt{x^2 - 4}$

$x^2 - 4 < 0 \Rightarrow x^2 \leq 4 \Rightarrow x < \mp 2$

$\therefore Dy = \{x : x \in \frac{R}{x} < \mp 2\}$

2. $y = \sqrt{x^2 + 4}$

$x^2 + 4 < 0 \Rightarrow x^2 + 4 < 0 \Rightarrow x^2 < -4$ imagenary الجذر

3. $f(x) = \frac{3x^2 - 4}{\sqrt[3]{x-1} - 2}$

Soly

the first , find the value of x so that makes the

denominator zero نجاول نقيم x اللي تجعل المقام صفر

$$(\sqrt[3]{x-1} - 2 = 0)^3$$

$$x - 1 = 8 \Rightarrow x = 9$$

$$\therefore Dy = \{ x : x \in R \; , \; x \neq 9 \}$$

Ex Find the domain of the function.-

$$f(x) = \frac{2x - 1}{x^2 - 9}$$

Solu

$$x^2 - 9 = 0$$

$$x^2 = 9 \Rightarrow x = \pm 3$$

$$\therefore Dy = \{ x : x \in R \; , \; x = \pm 3 \}$$

Special Kind of functions انواع خاصة من الدوال

1. Fixed Function

It is a function in which the corresponding field is a constant, for example is:-

هي الدالة التي يكون فيها المجال المقابل ثابت

$y = f(x)$; $y = k$ → constant

$y = 27$; $y = 5$; and soon

2. Identity Function

It is a function in which the range is equal to the domain (Domain = Range)