

POLYNOMIALS

Degree of a Polynomial

Highest power of variable in the polynomials

$P(x) = 3x + 4$ degree 1 (Linear)

$P(x) = x^2 - 3x + 4$ degree 2 (Quadratic)

$P(x) = x^3 + 2x^2 + 3x - 5$ degree 3 (Cubic)

Quadratic Polynomial

$$f(x) = ax^2 + bx + c$$

Quadratic polynomial is $ax^2 + bx + c$ where $a \neq 0$. There are at most two zeroes of quadratic polynomial.

$$\begin{aligned} \text{sum of Zeroes} &= \frac{-b}{a} \\ &= \frac{\text{coefficient of } x}{\text{coefficient of } x^2} \end{aligned}$$

$$\begin{aligned} \text{Product of Zeroes} &= \frac{c}{a} \\ &= \frac{\text{constant term}}{\text{coefficient of } x^2} \end{aligned}$$

Cubic Polynomial

$$f(x) = ax^3 + bx^2 + cx + d$$

cubic polynomial of $ax^3 + bx^2 + cx + d$ where $a \neq 0$. There are at most three zeroes of cubic polynomial.

$$\begin{aligned} \text{Sum of Zeroes} &= \frac{-b}{a} \\ &= \frac{\text{coefficient of } x^2}{\text{coefficient of } x^3} \end{aligned}$$

Sum of Product of Zeroes taken two

$$\begin{aligned} \text{at a time a time} &= \frac{c}{a} \\ &= \frac{\text{coefficient of } x}{\text{coefficient of } x^3} \end{aligned}$$

$$\begin{aligned} \text{Product of Zeroes} &= \frac{-d}{a} \\ &= \frac{\text{constant term}}{\text{coefficient of } x^3} \end{aligned}$$

Factor Theorem

$(x - a)$ is a factor of the polynomial $f(x)$ if and only if $f(a) = 0$

Remainder Theorem

A polynomial $P(x)$ of a degree greater than or equal to one is divided by a linear polynomial $(x - a)$, where a is a real number, then the remainder is r which is also equal to $P(a)$.

Value of a polynomial

Replace x with k i.e $p(k)$

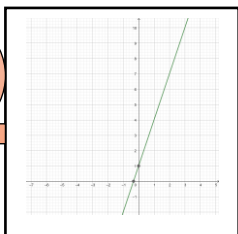
For ex If $p(x) = x^2 - 3x + 4$

Value at $x = 2$

$$P(x) = (2)^2 - 3(2) + 4 = 2$$

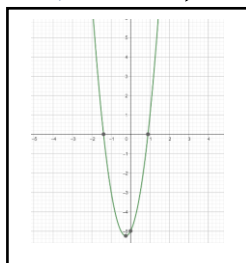
Geometrical Representation of Zeroes

one Zero



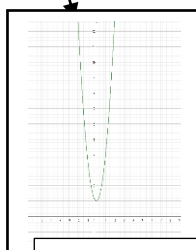
It cuts the x - axis at one point

2 Zeroes



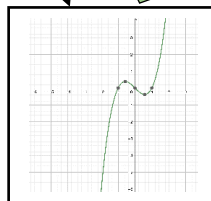
It cuts the x - axis at two points

0 Zeroes



It cuts the x - axis at no point

3 Zeroes



It cuts the x - axis at three point