Chapter-02

Polynomials

- An algebraic expression of the form $a_0x^n + a_1x^{n-1} + a_2x^{n-2} + \ldots + a_{n-1}x + a_n$, where $a_0, a_1, a_2 \ldots a_n$ are real numbers, n is a non-negative integer and $a_0 \neq 0$ is called a polynomial of degree n.
- **Degree:** The highest power of x in a polynomial p(x) is called the degree of polynomial.
- Polynomials of degrees 1, 2 and 3 are called linear, quadratic and cubic polynomials respectively.
- **Types of Polynomial:**
  - (i) **Constant Polynomial:** A polynomial of degree zero is called a constant polynomial and it is of the form p(x) = k.
  - (ii) **Linear Polynomial:** A polynomial of degree one is called linear polynomial and it is of the form p(x) = ax + b where a, b are real numbers and $a_0 \neq 0$.
  - (iii) **Quadratic Polynomial:** A quadratic polynomial in x with real coefficient is of the form $^2 + bx + c$, where a, b, c are real numbers with $a \neq 0$.
  - (iv) **Cubical Polynomial:** A polynomial of degree three is called cubical polynomial and is of the form p(x) = $ax^3 + bx^2 + cx + d$ where a, b, c, d are real numbers and $a \neq 0$.
  - (v) **Bi-quadratic Polynomial:** A polynomial of degree four is called bi-quadratic polynomial and it is of the form $p(x) = ax^2 + bx^3 + cx^2 + dx + e$, where a, b, c, d, e are real numbers and $a \neq 0$.
- The zeroes of a polynomial p(x) are precisely the x–coordinates of the points where the graph of y = p(x) intersects the x-axis i.e. x = a is a zero of polynomial p(x) if p(a) = 0.
- A polynomial can have at most the same number of zeros as the degree of polynomial.
- For quadratic polynomial $ax^2 + bx + c$ $\neq 0$) Sum of zeros = $-\frac{b}{}$ Produce of zeros = a
- The division algorithm states that given any polynomial p(x) and polynomial g(x), there are polynomials q(x) and r(x) such that: $p(x) = g(x).q(x) + r(x), g(x) \neq 0$ where r(x) = 0 or degree of r(x) < degree of g(x)
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