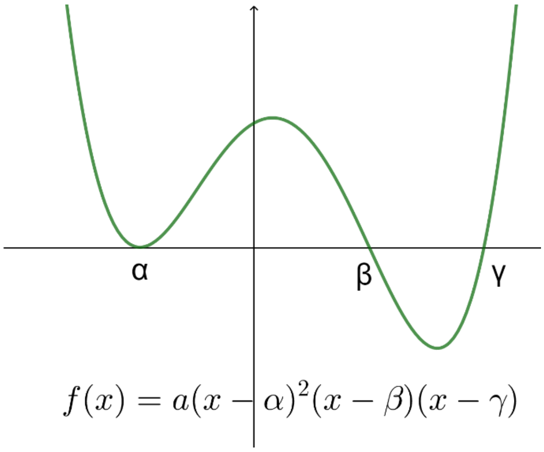
Sum and Product of Roots of Polynomial Equations



We tend to use Greek letters $\alpha, \beta, \gamma, \ldots$ to represent the roots of polynomial equations.

The sum of the roots and the product of the roots are directly related to the polynomial equation.

Degree	Polynomial equation	Sum of Roots	Product of Roots
2	$a_2x^2 + a_1x + a_0 = 0$	$-\frac{a_1}{a_2}$	$\frac{a_0}{a_2}$
3	$a_3x^3 + a_2x^2 + a_1x + a_0 = 0$	$-\frac{a_2}{a_3}$	$-\frac{a_0}{a_3}$
4	$a_4x^4 + a_3x^3 + a_2x^2 + a_1x + a_0 = 0$	$-\frac{a_3}{a_4}$	$\frac{a_0}{a_4}$
5	$a_5x^5 + a_4x^4 + a_3x^3 + a_2x^2 + a_1x + a_0 = 0$	$-\frac{a_4}{a_5}$	$-\frac{a_0}{a_5}$
n	$a_nx^n + a_{n-1}x^{n-1} + \cdots + a_1x + a_0 = 0$	$-\frac{a_{n-1}}{a_n}$	$(-1)^n\frac{a_0}{a_n}$
n	$\sum_{r=1}^{n} a_rx^r$	$-\frac{a_{n-1}}{a_n}$	$(-1)^n\frac{a_0}{a_n}$

Questions on roots of polynomials can also include complex roots…

Complex Roots of Polynomial Equations

The **conjugate root** theorem states that if the complex number $a + bi$ is a root of a polynomial f(x) in one variable with real coefficients, then the complex **conjugate** $a - bi$ is also a root of that polynomial.