

Introduction to Quadratic Equations

Many of the applications we encounter in the study of algebra involve solving quadratic equations of the form $ax^2 + bx + c = 0$.

Quadratic equations can have 0, 1 or 2 solutions in the real number system.

Test for the number of solutions of a quadratic equation

Define the discriminant $(b^2 - 4ac)$

If $(b^2 - 4ac) > 0$, there are 2 solutions in the real number system

If $(b^2 - 4ac) = 0$, there is 1 solution in the real number system

If $(b^2 - 4ac) < 0$, there are no solutions in the real number system

Examples:

$$6x^2 + 5x - 4 = 0$$

$$(b^2 - 4ac) = 5^2 - (4)(6)(-4) = 25 - (-48) = 25 + 48 = 73$$

$73 > 0$ so there are 2 solutions

$$x^2 - 2x + 1 = 0$$

$$(b^2 - 4ac) = 2^2 - (4)(1)(1) = 4 - 4 = 0$$

$0 = 0$ so there is 1 solution

$$x^2 + 1 = 0$$

$$(b^2 - 4ac) = 0^2 - (4)(1)(1) = 0 - 4 = -4$$

$-4 < 0$ so there are no solutions