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Complexity in Quadratic

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Abstract : ***The article gives an insight into finding the roots of a quadratic equation by reaching the same conclusion as by the Shri Dharacharya's formula, unconventionally, utilizing properties of complex numbers as roots of the equation.***

Keywords: complex, quadratic, roots, quadratic formula

Consider the quadratic Equation: $ax^2 + bx + c = 0$

As the root of the equation will be in the form of

y+iz where if the root is real then the value of z becomes 0.

So replacing x with y+iz as it will be the root of the quadratic equation therefore satisfying it.

$$a(y + iz)^2 + b(y + iz) + c = 0$$

$$ay^2 - az^2 + by + c + 2iayz + ibz = 0$$

It's real and imaginary part both should equal 0

$$ay^2 - az^2 + by + c = 0 \quad \text{and} \quad 2iayz + ibz = 0$$

The imaginary part equation gives us

$$(iz)(2ay + b) = 0$$

$$\text{This gives } y = -\frac{b}{2a} \quad \text{or } z = 0$$

Putting value of y in other equation

$$\text{we get, } z = \frac{\pm(4ac - b^2)^{\frac{1}{2}}}{2a}$$

x=y + iz

=> **Root** = $x = \frac{-b \pm (b^2 - 4ac)^{\frac{1}{2}}}{2a}$