

If α and β are the zeroes of the polynomial $p(x) = ax^2 + bx + c$, then evaluate $\alpha - \beta$.

Vieta's formula for the second degree polynomial $(x) = ax^2 + bx + c$:

roots α and β of the equation $p(x) = 0$ satisfy

$$\alpha + \beta = -b/a \quad \alpha\beta = c/a$$

Therefore:

$$(\alpha + \beta)^2 - 4\alpha\beta = \alpha^2 + 2\alpha\beta + \beta^2 - 4\alpha\beta = \alpha^2 - 2\alpha\beta + \beta^2 = (\alpha - \beta)^2$$

$$(\alpha - \beta)^2 = \left(-\frac{b}{a}\right)^2 - \frac{4c}{a} = \left(\frac{b}{a}\right)^2 - \frac{4c}{a}$$

$$\alpha - \beta = \pm \sqrt{\left(\frac{b}{a}\right)^2 - \frac{4c}{a}} = \pm \frac{1}{a} \sqrt{b^2 - 4ac} = \pm \frac{\sqrt{D}}{a}$$

D – discriminant

$$\text{Answer: } \alpha - \beta = \pm \frac{1}{a} \sqrt{b^2 - 4ac}$$