

Solving Quadratic Inequalities in Algebra

$$ax^2 + bx + c \leq 0 \quad (a > 0, b, c \in \mathbb{R})$$

▶ Start

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$$\text{Let } D = b^2 - 4ac$$

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$$x^2 + \frac{b}{a}x + \frac{c}{a} \leq 0 \quad (\because a > 0)$$

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Let α and β be roots of $ax^2 + bx + c = 0$ where $\alpha < \beta$.
($\because b^2 - 4ac > 0$)

$$(x - \alpha)(x - \beta) \leq 0$$

- i) $x - \alpha \geq 0, x - \beta \leq 0 \Rightarrow \alpha \leq x \leq \beta$
 - ii) $x - \alpha \leq 0, x - \beta \geq 0 \Rightarrow$ No solutions
- by i), ii) $\therefore \alpha \leq x$

Solving Quadratic Inequalities in Algebra

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$$\therefore x = -\frac{b}{2a}$$

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\therefore No solutions

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\therefore No solutions ($\because b^2 - 4ac < 0$)