

이차방정식의 근의 공식

(Formula of Root of Quadratic Polynomial Equations)

Formula of Root of Quadratic Polynomial Equations

▶ Start

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

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

$$a \times x^2 + a \times \frac{b}{a}x + c = 0 \quad (\because a \neq 0)$$

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▶ End

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

$$a \times x^2 + a \times \frac{b}{a}x + c = 0 \quad (\because a \neq 0)$$

$$a \left(x^2 + \frac{b}{a}x \right) + c = 0$$

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

$$a \times x^2 + a \times \frac{b}{a}x + c = 0 \quad (\because a \neq 0)$$

$$a \left(x^2 + \frac{b}{a}x \right) + c = 0$$

$$a \left(x^2 + 2 \times \frac{b}{2a}x \right) + c = 0$$

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▶ End

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

$$a \left(x^2 + \frac{b}{a}x \right) + c = 0$$

$$a \left(x^2 + 2 \times \frac{b}{2a}x \right) + c = 0$$

$$a \left\{ x^2 + 2 \times \frac{b}{2a}x + \left(\frac{b}{2a} \right)^2 - \left(\frac{b}{2a} \right)^2 \right\} + c = 0$$

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▶ End

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

$$a \left(x^2 + 2 \times \frac{b}{2a} x \right) + c = 0$$

$$a \left\{ x^2 + 2 \times \frac{b}{2a} x + \left(\frac{b}{2a} \right)^2 - \left(\frac{b}{2a} \right)^2 \right\} + c = 0$$

$$a \left\{ x^2 + 2 \times \frac{b}{2a} x + \left(\frac{b}{2a} \right)^2 \right\} - a \times \left(\frac{b}{2a} \right)^2 + c = 0$$

▶ Start

▶ End

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

$$a \left\{ x^2 + 2 \times \frac{b}{2a}x + \left(\frac{b}{2a} \right)^2 - \left(\frac{b}{2a} \right)^2 \right\} + c = 0$$

$$a \left\{ x^2 + 2 \times \frac{b}{2a}x + \left(\frac{b}{2a} \right)^2 \right\} - a \times \left(\frac{b}{2a} \right)^2 + c = 0$$

$$a \left(x + \frac{b}{2a} \right)^2 - a \times \left(\frac{b}{2a} \right)^2 + c = 0$$

▶ Start

▶ End

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

$$a \left\{ x^2 + 2 \times \frac{b}{2a}x + \left(\frac{b}{2a} \right)^2 \right\} - a \times \left(\frac{b}{2a} \right)^2 + c = 0$$

$$a \left(x + \frac{b}{2a} \right)^2 - a \times \left(\frac{b}{2a} \right)^2 + c = 0$$

$$a \left(x + \frac{b}{2a} \right)^2 = a \times \left(\frac{b}{2a} \right)^2 - c$$

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▶ End

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

$$a \left(x + \frac{b}{2a} \right)^2 - a \times \left(\frac{b}{2a} \right)^2 + c = 0$$

$$a \left(x + \frac{b}{2a} \right)^2 = a \times \left(\frac{b}{2a} \right)^2 - c$$

$$\left(x + \frac{b}{2a} \right)^2 = \left(\frac{b}{2a} \right)^2 - \frac{c}{a}$$

▶ Start

▶ End

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

$$a \left(x + \frac{b}{2a} \right)^2 = a \times \left(\frac{b}{2a} \right)^2 - c$$

$$\left(x + \frac{b}{2a} \right)^2 = \left(\frac{b}{2a} \right)^2 - \frac{c}{a}$$

$$\left(x + \frac{b}{2a} \right)^2 = \frac{b^2}{(2a)^2} - \frac{c}{a}$$

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▶ End

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

$$\left(x + \frac{b}{2a}\right)^2 = \left(\frac{b}{2a}\right)^2 - \frac{c}{a}$$

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2}{(2a)^2} - \frac{c}{a}$$

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

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

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2}{(2a)^2} - \frac{c}{a}$$

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

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2}{4a^2} - \frac{4ac}{4a^2}$$

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

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$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2}{4a^2} - \frac{4ac}{4a^2}$$

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2 - 4ac}{4a^2}$$

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

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2}{4a^2} - \frac{4ac}{4a^2}$$

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2 - 4ac}{4a^2}$$

$$x + \frac{b}{2a} = \pm \sqrt{\frac{b^2 - 4ac}{4a^2}} \quad (\because a, b, c \in \mathbb{R})$$

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

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2 - 4ac}{4a^2}$$

$$x + \frac{b}{2a} = \pm \sqrt{\frac{b^2 - 4ac}{4a^2}} \quad (\because a, b, c \in \mathbb{R})$$

$$x + \frac{b}{2a} = \pm \frac{\sqrt{b^2 - 4ac}}{\sqrt{4a^2}}$$

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

$$x + \frac{b}{2a} = \pm \sqrt{\frac{b^2 - 4ac}{4a^2}} \quad (\because a, b, c \in \mathbb{R})$$

$$x + \frac{b}{2a} = \pm \frac{\sqrt{b^2 - 4ac}}{\sqrt{4a^2}}$$

$$x + \frac{b}{2a} = \pm \frac{\sqrt{b^2 - 4ac}}{\sqrt{(2a)^2}}$$

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

$$x + \frac{b}{2a} = \pm \frac{\sqrt{b^2 - 4ac}}{\sqrt{4a^2}}$$

$$x + \frac{b}{2a} = \pm \frac{\sqrt{b^2 - 4ac}}{\sqrt{(2a)^2}}$$

$$x + \frac{b}{2a} = \begin{cases} \pm \frac{\sqrt{b^2 - 4ac}}{2a} & , a > 0 \\ \mp \frac{\sqrt{b^2 - 4ac}}{2a} & , a < 0 \end{cases}$$

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

$$x + \frac{b}{2a} = \pm \frac{\sqrt{b^2 - 4ac}}{\sqrt{(2a)^2}}$$

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$$x + \frac{b}{2a} = \pm \frac{\sqrt{b^2 - 4ac}}{2a}$$

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

$$x + \frac{b}{2a} = \begin{cases} \pm \frac{\sqrt{b^2 - 4ac}}{2a} & , a > 0 \\ \mp \frac{\sqrt{b^2 - 4ac}}{2a} & , a < 0 \end{cases}$$

$$x + \frac{b}{2a} = \pm \frac{\sqrt{b^2 - 4ac}}{2a}$$

$$x = -\frac{b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a}$$

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▶ End

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

$$x + \frac{b}{2a} = \pm \frac{\sqrt{b^2 - 4ac}}{2a}$$

$$x = -\frac{b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a}$$

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▶ Start

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

$$x = -\frac{b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\therefore x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\therefore x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

▶ Start

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

$$\therefore x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Github:

<https://min7014.github.io/math20210415001.html>

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