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QUADRATIC EQUATIONS

Solution of a Quadratic Equation by Completing the Square.

Chapter: 4, Exercise: 4.3

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Find the roots of the equation $5x^2 - 6x - 2 = 0$ by the method of completing square.

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

multiplying by 5

$25x^2 - 30x - 10 = 0$

$(5x)^2 - 30x - 10 = 0$

$(5x)^2 - 30x + (3)^2 - (3)^2 - 10 = 0$

$(5x-3)^2 - 9 - 10 = 0$

$(5x-3)^2 - 19 = 0$

$(5x-3)^2 = 19$

$(5x-3) = \pm\sqrt{19}$

$5x = \pm\sqrt{19} + 3$

$x = \frac{3 \pm \sqrt{19}}{5}$

$\left[x = \frac{3+\sqrt{19}}{5}, \frac{3-\sqrt{19}}{5} \right]$

Find the roots of the equation $2x^2 - 7x + 3 = 0$ by the method of completing square.

$2x^2 - 7x + 3 = 0$

multiplying by 2

$4x^2 - 14x + 6 = 0$

$(2x)^2 - 14x + 6 = 0$

$(2x)^2 - 14x + \left(\frac{7}{2}\right)^2 - \left(\frac{7}{2}\right)^2 + 6 = 0$

$\left(2x - \frac{7}{2}\right)^2 - \frac{49}{4} + 6 = 0$

$\left(2x - \frac{7}{2}\right)^2 + \left(\frac{-49+24}{4}\right) = 0$

$\left(2x - \frac{7}{2}\right)^2 + \left(\frac{-25}{4}\right) = 0$

$\left(2x - \frac{7}{2}\right)^2 - \frac{25}{4} = 0$

$\left(2x - \frac{7}{2}\right)^2 = \frac{25}{4}$

$\left(2x - \frac{7}{2}\right) = \pm\sqrt{\frac{25}{4}} = \pm\frac{5}{2}$

$$\left(2x - \frac{1}{2}\right) = \pm \frac{5}{2}$$

$$2x = \frac{1}{2} \pm \frac{5}{2}$$

$$2x = \frac{1}{2} + \frac{5}{2}$$

$$2x = \frac{1+5}{2}$$

$$2x = \frac{12}{2}^{6}$$

$$x = \frac{6}{2}^{3}$$

$$x = 3$$

$$2x = \frac{1}{2} - \frac{5}{2}$$

$$2x = \frac{1-5}{2}$$

$$2x = \frac{-4}{2}$$

$$x = -\frac{1}{2}$$

$$\boxed{x = -\frac{1}{2}}$$

$$\left(x = 3, -\frac{1}{2}\right).$$

Find the roots of the equation $2x^2 + x - 4 = 0$ by the method of completing square.

$2ab$

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

multiplying by 2

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

$(2x)^2 + 2x - 4 = 0$

$(2x)^2 + 2x + \left(\frac{1}{2}\right)^2 - \left(\frac{1}{2}\right)^2 - 4 = 0$

$\left(2x + \frac{1}{2}\right)^2 - \frac{1}{4} - 4 = 0$

$\left(2x + \frac{1}{2}\right)^2 - \left(\frac{1}{4} + 4\right) = 0$

$\left(2x + \frac{1}{2}\right)^2 - \left(\frac{1+16}{4}\right) = 0$

$\left(2x + \frac{1}{2}\right)^2 - \left(\frac{17}{4}\right) = 0$

$\left(2x + \frac{1}{2}\right)^2 = \frac{17}{4}$

$\left(2x + \frac{1}{2}\right) = \pm\sqrt{\frac{17}{4}} = \pm\frac{\sqrt{17}}{2}$

$2x = -\frac{1}{2} \pm \frac{\sqrt{17}}{2}$

$$2x = -\frac{1}{2} \pm \frac{\sqrt{17}}{2}$$

$$2x = \frac{-1 \pm \sqrt{17}}{2}$$

$$x = \frac{-1 \pm \sqrt{17}}{4}$$

$$x = \frac{-1 + \sqrt{17}}{4}$$

$$x = \frac{-1 - \sqrt{17}}{4}$$

Find the roots of the equation $4x^2 + 4\sqrt{3}x + 3$ by the method of completing square.

$4x^2 + 4\sqrt{3}x + 3 = 0$

$(2x)^2 + 4\sqrt{3}x + 3 = 0$

$(2x)^2 + 4\sqrt{3}x + (\sqrt{3})^2 - (\sqrt{3})^2 + 3 = 0$

$(2x + \sqrt{3})^2 - 3 + 3 = 0$

$(2x + \sqrt{3})^2 = 0$

$(2x + \sqrt{3})(2x + \sqrt{3}) = 0$

$2x = -\sqrt{3}$

$x = -\frac{\sqrt{3}}{2}$

$x = -\frac{\sqrt{3}}{2}, -\frac{\sqrt{3}}{2}$

$2ab = 4\sqrt{3}x$

$ab = \frac{4\sqrt{3}x}{2}$

$ab = 2\sqrt{3}x$

$2b = 2\sqrt{3}x$

$b = \frac{2\sqrt{3}x}{2}$

$b = \sqrt{3}x$

Find the roots of the equation $2x^2 + x + 4 = 0$ by the method of completing square.

$2x^2 + x + 4 = 0$

multiplying by (2) both side

$4x^2 + 2x + 8 = 0$

$(2x)^2 + 2x + 8 = 0$

$(2x)^2 + 2x + (\frac{1}{2})^2 - (\frac{1}{2})^2 + 8 = 0$

$(2x + \frac{1}{2})^2 - \frac{1}{4} + 8 = 0$

$(2x + \frac{1}{2})^2 + (\frac{-1 + 32}{4}) = 0$

$(2x + \frac{1}{2})^2 + (\frac{31}{4}) = 0$

$(2x + \frac{1}{2})^2 = -\frac{31}{4}$

$(2x + \frac{1}{2}) = \pm\sqrt{\frac{-31}{4}}$

There no Real Root of the equation

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