Solve by Completing the Square

$x^2 - 6x + 12 = 0$

$x^2 - 6x + 9 = -12 + 9$

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

$x - 3 = \pm\sqrt{-3}$

$x = 3 \pm \sqrt{-3}$

$3 \pm \sqrt{3}\,i$

Complex

$\frac{2x^2}{2} - \frac{6x}{2} + \frac{5}{2} = \frac{0}{2}$ $\quad \left(\frac{3}{2}\right)^2 = \frac{9}{4}$

$x^2 - 3x + \frac{5}{2} = 0$

$x^2 - 3x + \frac{9}{4} = -\frac{5}{2} + \frac{9}{4}$

$-\frac{10}{4} + \frac{9}{4}$

$\sqrt{\left(x - \frac{3}{2}\right)^2} = \sqrt{\frac{1}{4}}$

$x - \frac{3}{2} = \pm\sqrt{\frac{-1}{4}}$

$x = \frac{3}{2} \pm \sqrt{\frac{-1}{4}}$

$\frac{3}{2} \pm \frac{1}{2}i$

Complex

Solve by Completing the Square

$-5x^2 + 50x - 135 = 0$

$x^2 - 10x + 27 = 0$

$x^2 - 10x + 25 = -27 + 25$

$\sqrt{(x-5)^2} = \sqrt{-2}$

$x - 5 = \pm\sqrt{-2}$

$x = 5 \pm \sqrt{2}\,i$

Complex

$-x^2 - 9x + 11 = 0$

$x^2 + 9x - 11 = 0$

$x^2 + 9x + \frac{81}{4} = 11 + \frac{81}{4}$

$\frac{44}{4} + \frac{81}{4}$

$\sqrt{\left(x + \frac{9}{2}\right)^2} = \sqrt{\frac{125}{4}}$

$x + \frac{9}{2} = \pm\sqrt{\frac{125}{4}}$

$x = -\frac{9}{2} \pm \frac{\sqrt{125}}{2}$

Irrational

Solve by using the Quadratic Formula $\frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$a=7 \quad b=2 \quad c=8$

$7x^2 + 2x + 8 = 0$

$\frac{-2 \pm \sqrt{2^2-4(7)(8)}}{2(7)}$

$\frac{-2 \pm \sqrt{4-224}}{14}$

$\frac{-2 \pm \sqrt{-220}}{14}$

$\frac{-2}{14} \pm \frac{\sqrt{220}}{14} i$

$x^2 + 5x - 31 = 0$

$\frac{-5 \pm \sqrt{5^2-4(1)(-31)}}{2(1)}$

$\frac{-5 \pm \sqrt{25-(-124)}}{2}$

$\frac{-5 \pm \sqrt{149}}{2}$

$-\frac{5}{2} \pm \frac{\sqrt{149}}{2}$

Solve by using the Quadratic Formula

$4x^2 - 3x + 2 = 0$

$$\frac{3 \pm \sqrt{(-3)^2 - 4(4)(2)}}{2(4)}$$

$$\frac{3 \pm \sqrt{9 - 32}}{8}$$

$$\frac{3 \pm \sqrt{-23}}{8}$$

$$\frac{3}{8} \pm \frac{\sqrt{23}}{8} i$$

$10x^2 - 4x + 10 = 0$

$$\frac{4 \pm \sqrt{4^2 - 4(10)(10)}}{2(10)}$$

$$\frac{4 \pm \sqrt{16 - 400}}{20}$$

$$\frac{4 \pm \sqrt{-384}}{20}$$

$$\frac{1}{5} \pm \frac{\sqrt{384}}{20} i$$

$$\sqrt{384} = \sqrt{64} \cdot \sqrt{6}$$

$$= \frac{8\sqrt{6}}{20}$$

$$\frac{2\sqrt{6}}{5} i$$

$$\frac{1}{5} \pm \frac{2\sqrt{6}}{5} i$$

Solve by Completing the Square

$x^2 + 18x - 13 = 0$

$x^2 + 18x + 81 = 13 + 81$

$(x+9)^2 = 94$

$x + 9 = \pm\sqrt{94}$

$x = -9 \pm \sqrt{94}$

Irrational

$\frac{3x^2 + 12x + 8 = 0}{3}$

$x^2 + 4x + \frac{8}{3} = 0$ (4)

$x^2 + 4x + 4 = -\frac{8}{3} + \frac{12}{3}$

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

$x + 2 = \pm\sqrt{\frac{4}{3}}$

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

Solve the Quadratic. Classify each solution as rational, irrational, or complex

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

$\frac{1}{5} \pm \frac{\sqrt{96}}{10} i$

$-x^2 + 4x - 5 = 0$

$2 \pm i$

$2x^2 - 6x + 7 = 0$

$\frac{3}{2} \pm \frac{\sqrt{5}}{2} i$

$4x^2 + 9x + 3 = 0$

$-\frac{9}{8} \pm \frac{\sqrt{33}}{8}$

$x^2 + 4x + 5 = 0$

$-2 \pm i$

$5x^2 - 4x + 1 = 0$

$\frac{2}{5} \pm \frac{1}{5} i$