

Quadratic Formula

Form: $ax^2 + bx + c = 0$

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

① $21x^2 + x - 2 = 0$
 $a = 21, b = 1, c = -2$

$$x = \frac{-1 \pm \sqrt{(1)^2 - 4(21)(-2)}}{2(21)}$$

$$= \frac{-1 \pm \sqrt{1 + 168}}{42}$$

$$= \frac{-1 \pm \sqrt{169}}{42}$$

$$= \frac{-1 \pm 13}{42}$$

$$\xrightarrow{\oplus} x = \frac{-1 + 13}{42}$$

$$= \frac{12}{42}$$

$$= \frac{2}{7}$$

$$\begin{array}{r} 13 \\ 13 \\ \hline 39 \\ 120 \\ \hline 169 \end{array}$$

$$\begin{array}{r} 123 \\ 123 \\ \hline 57 \end{array}$$

$$\begin{array}{r} 84 \\ 84 \\ \hline 168 \end{array}$$

$$\begin{array}{r} x = -\frac{1 - 13}{42} \\ = -\frac{14}{42} \\ = -\frac{2}{6} \\ = -\frac{1}{3} \end{array}$$

$$\boxed{-\frac{1}{3}}$$

② $x + \frac{1}{x} = 5$

$$x + \frac{1}{x} - 5 = 0$$

$$x(x) + x(\frac{1}{x}) + x(-5) = 0$$

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

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

$$a = 1, b = -5, c = 1$$

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

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

$$= \frac{5 \pm \sqrt{25 - 4}}{2}$$

$$= \frac{5 \pm \sqrt{21}}{2}$$

③

$$7w^2 = -2w + 3$$

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

$$a = 7, b = 2, c = -3$$

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

$$= \frac{-2 \pm \sqrt{(2)^2 - 4(7)(-3)}}{2(7)}$$

$$\begin{array}{r} 3 \\ 3 \\ \hline 84 \end{array}$$

$$= \frac{-2 \pm \sqrt{4 + 84}}{14}$$

$$= \frac{-2 \pm \sqrt{88}}{14}$$

$$= \frac{-2 \pm \sqrt{2 \cdot 2 \cdot 2 \cdot 11}}{14}$$

$$= \frac{-2 \pm 2\sqrt{22}}{14}$$

$$\begin{array}{r} -1 \pm \sqrt{22} \\ 7 \\ \hline \end{array}$$

$$\boxed{\frac{-1 \pm \sqrt{22}}{7}}$$

④ $3x^2 - 5x + 9 = 0$

$$a = 3, b = -5, c = 9$$

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

$$= \frac{-(-5) \pm \sqrt{(-5)^2 - 4(3)(9)}}{2(3)}$$

$$\begin{array}{r} 12 \\ 12 \\ \hline 108 \\ 108 \\ \hline 35 \\ 35 \\ \hline 83 \end{array}$$

$$= \frac{5 \pm \sqrt{25 - 108}}{6}$$

$$= \frac{5 \pm \sqrt{-83}}{6}$$

$$= \frac{5 \pm i\sqrt{83}}{6}$$

$$\boxed{\frac{5}{6} \pm \frac{i\sqrt{83}}{6}}$$