3.5 Quadratic Formula

The quadratic formula was developed by completing the square of $ax^2+bx+c=0$, $a \neq 0$.

The roots/solutions are $\boxed{x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}}$

ex.1 $2x^2 - 3x + 1 = 0$ (*) important $\boxed{ax^2+bx+c=0}$

$a = 2 \quad b = -3 \quad c = 1$

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

$$= \frac{3 \pm \sqrt{9-8}}{4}$$

$$= \frac{3 \pm \sqrt{1}}{4}$$

$$= \frac{3 \pm 1}{4} \quad \begin{cases} \frac{3+1}{4} = \frac{4}{4} = 1 \\ \frac{3-1}{4} = \frac{2}{4} = \frac{1}{2} \end{cases}$$

ex.2 $5x^2 = 8x$

$5x^2 - 8x = 0$ (*)

$a = 5 \quad b = -8 \quad c = 0$

$$x = \frac{8 \pm \sqrt{64-0}}{10}$$

$$x = \frac{8 - \sqrt{64 - 0}}{10}$$

$$x = \frac{8 \pm 8}{10}$$

$$\frac{8+8}{10} = \frac{16}{10} = \frac{8}{5}$$

$$\frac{8-8}{10} = \frac{0}{10} = 0$$

ex.3 $(2x+1)(x-1) = 5x$

FORMAT $ax^2 + bx + c = 0$

$$2x^2 \underline{-2x} \underline{+x} - 1 = 5x$$

$$\underline{-5x} \qquad -5x$$

$$2x^2 - 6x - 1 = 0$$

$$x = \frac{6 \pm \sqrt{36 - 4(2)(-1)}}{4}$$

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

$$x = \frac{6 \pm \sqrt{36 - (-8)}}{4}$$

$$x = \frac{6 \pm \sqrt{44}}{4}$$

$$\sqrt{44} = \sqrt{4 \times 11}$$
$$= 2\sqrt{11}$$

$$x = \frac{6 \pm 2\sqrt{11}}{4}$$

$$\boxed{x = \frac{3 \pm \sqrt{11}}{2}}$$ exact

p 236 # 4-7, 11 a,c, 12a

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

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