

$$\underline{x^2 + bx + c}$$

Ex 1:

(a) $x^2 - 13x + \frac{169}{4}$ ✓

(b) $x^2 + 28x + 196 = (x+14)^2$

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

Ex 2: Solve $x^2 - 3x + 1 = 0$

$$\underline{x^2 - 3x + \frac{9}{4} - \frac{9}{4} + 1 = 0}$$

$$(x - \frac{3}{2})^2 - \frac{9}{4} + \frac{4}{4} = 0$$

$$(x - \frac{3}{2})^2 - \frac{5}{4} = 0, \quad (x - \frac{3}{2})^2 = \frac{5}{4}$$

$$x - \frac{3}{2} = \pm \sqrt{\frac{5}{4}} \quad \text{and} \quad \sqrt{\frac{5}{4}} = \frac{\sqrt{5}}{\sqrt{4}} = \frac{\sqrt{5}}{2}$$

$$x_{1,2} = \frac{3}{2} \pm \frac{\sqrt{5}}{2}$$

$$x_1 = \frac{3 + \sqrt{5}}{2} \approx 2.618 \quad x_2 = \frac{3 - \sqrt{5}}{2}$$

↑ exactly equals ↑ approximately equals.

$$x^2 = 4$$

$$x = 2, x = -2$$

$$(2)^2 = 4, (-2)^2 = 4$$

Ex 3: $2x^2 + 3x - 1 = 0$

factor out $\textcircled{2}$ from first two terms.

$$2(x^2 + \frac{3}{2}x) - 1 = 0$$

$$2(x^2 + \frac{3}{2}x + \frac{9}{16} - \frac{9}{16}) - 1 = 0$$

$$2(x^2 + \frac{3}{2}x + \frac{9}{16}) - \frac{9}{8} - \frac{8}{8} = 0$$

$$2(x + \frac{3}{4})^2 - \frac{17}{8} = 0, \quad 2(x + \frac{3}{4})^2 = \frac{17}{8}$$

$$(x + \frac{3}{4})^2 = \frac{17}{16}, \quad x + \frac{3}{4} = \pm \sqrt{\frac{17}{16}}, \quad x + \frac{3}{4} = \pm \frac{\sqrt{17}}{4}$$

$$x_{1,2} = -\frac{3}{4} \pm \frac{\sqrt{17}}{4} \rightarrow x_1 = -\frac{3 + \sqrt{17}}{4}, \quad x_2 = -\frac{3 - \sqrt{17}}{4}$$