

Formulas
 completing the
 square

$$x^2 \pm bx + \left(\frac{b}{2}\right)^2 = 15 + \left(\frac{b}{2}\right)^2$$

$$\left(x \pm \frac{b}{2}\right)^2 = \text{some \#}$$

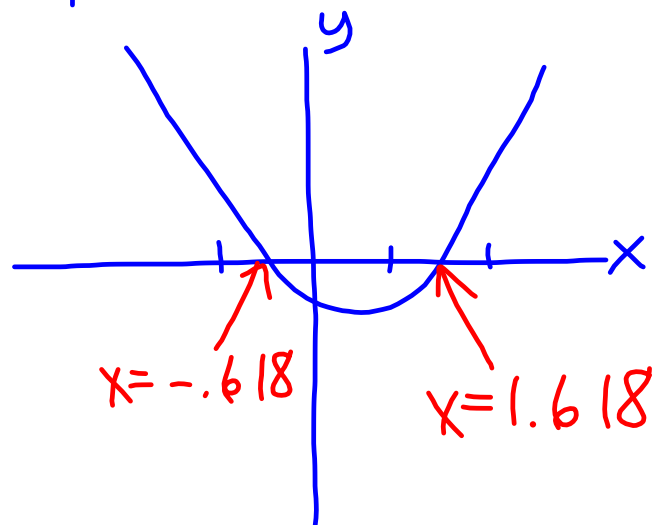
→ square root of both sides

$$x \pm \frac{b}{2} = \pm \sqrt{\dots\dots}$$

Def: $i = \sqrt{-1}$ $i^2 = -1$

#10 $x^2 - x = 1$ by graphing.

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



$$\#16 \quad 4x^2 = 16$$

$$x^2 = 4$$

$$x = \pm\sqrt{4}$$

$$x = \pm 2$$

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

$$\#24 \quad p. 283$$

$$9x^2 + 6x + 1 = 4$$

$$9x^2 + 6x = 3$$

$$\textcircled{1} \text{ add } \left(\frac{b}{2}\right)^2 \quad 9$$

$$x^2 + \frac{2}{3}x + \frac{1}{9} = \frac{1}{3} + \frac{1}{9}$$

$$\frac{2}{3} \cdot \frac{1}{2} = \frac{1}{3}$$

$$\left(\frac{1}{3}\right)^2 = \frac{1}{9}$$

$$\textcircled{2} \text{ factor } \left(x + \frac{1}{3}\right)^2 = \frac{4}{9}$$

$$\textcircled{3} \sqrt{\quad} \quad \text{both sides} \quad x + \frac{1}{3} = \pm \frac{2}{3}$$

$$\textcircled{4} \text{ simplify. } x = -\frac{1}{3} \pm \frac{2}{3}$$

$$x = -\frac{1}{3} + \frac{2}{3} \quad x = -\frac{1}{3} - \frac{2}{3}$$

$$x = \frac{1}{3} \quad x = -1$$

p. 283 #26

$$x^2 + 3x + \frac{9}{4} = -25 + \frac{9}{4}$$

$$\left(\frac{3}{2}\right)^2 = \frac{9}{4}$$

$$\left(x + \frac{3}{2}\right)^2 = -\frac{100}{4} + \frac{9}{4}$$

$$= -\frac{91}{4}$$

$$x + \frac{3}{2} = \pm \sqrt{\frac{-91}{4}}$$

$$x + \frac{3}{2} = \pm \frac{\sqrt{91}}{2} i$$

$$x = -\frac{3}{2} \pm \frac{\sqrt{91}}{2} i$$

Practice Completing The Square
Solve.

$$\begin{array}{l} \textcircled{1} \quad \textcircled{1} \quad x^2 - 4x = -5 \\ \frac{b}{2} = -2 \quad x^2 - 4x + 4 = -5 + 4 \\ \left(\frac{b}{2}\right)^2 = 4 \quad \textcircled{2} \text{ factor } (x-2)^2 = -1 \\ \textcircled{3} \quad \sqrt{\quad} \quad x-2 = \pm \sqrt{-1} \\ \textcircled{4} \text{ find } x \quad x = 2 \pm i \end{array}$$

$$\textcircled{2} \quad x^2 + 6x - 4 = 0$$

$$x^2 + 6x = 4$$

$$x^2 + 6x + 9 = 4 + 9$$

$$(x+3)^2 = 13$$

$$x+3 = \pm\sqrt{13}$$

$$x = -3 \pm \sqrt{13}$$

- 10 A company is selling an item and determines that the profit from selling the item for a price of x dollars is given by the function below.

vertex form

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

Which price will maximize the profit?

- A) \$4
 B) \$12
 C) \$16
 D) \$20

vertex
 $h = 16$

