8.1 Solving Quadratic Equations

By Completing the Square

Quadratic Equations

8.1.1 Give an example of a quadratic eqn.,

\[ 6x^2 + 37x + \frac{1}{2} = 0 \]

Give an example of something that is NOT a quadratic equation.

\[ x^2 - x + \sqrt{-10} = 0 \]

\[ 6 + 7x + 5 = 0 \]

Using the square root property to solve eqn.

If \( x^2 = c \)

then \( x = \pm \sqrt{c} \)
§ 8.1 Solving Quadratic Equations

By Completing the Square

[lecture notes p. 138]

Quadratic Equations

8.1.1 Give an example of a quadratic eq’n:

\[ 6x^2 + 3.7x + \frac{1}{2} = 0 \]

Give an example of something that is NOT a quadratic equation.

\[ x^2 - x + \sqrt{-10} = 0 \]

\[ 6 + 7x + 5 = 0 \]

Using the square root property to solve eq’n.

If \( x^2 = c \)

then \( x = \pm \sqrt{c} \)
8.1.2 Apply the square root property to these eqns.

a) \((4x + 9)^2 = 5\)
\[4x + 9 = \pm \sqrt{5}\]

b) \((3y)^2 = 0\)
\[3y = \pm \sqrt{0}\]

c) \((9z - 2)^2 = -4\)
\[9z - 2 = \pm \sqrt{-4}\]

d) \((1 - 2z)^2 = 72\)
\[1 - 2z = \pm \sqrt{72}\]

(7) Use the square root property to solve this eqn.
\((8x - 5)^2 = -49\)
\[8x - 5 = \pm \sqrt{-49}\]

Linear \(\Rightarrow\) Goal. Get 'x' alone
\[8x - 5 = \pm 7\]
\[8x = 5 \pm 7\]

\[x = \frac{5 \pm 7}{8}\]

\[x = \frac{5 - 7i}{8}\] \[x = \frac{5 + 7i}{8}\]
\[ S(t) = 16 + t^2 \]

Distance = 16 \( t^2 \)

\[ \frac{866}{16} = 16 \cdot \frac{t^2}{16} \]

\[ 54.125 = t^2 \]

\[ t^2 = 54.125 \]

\[ t = \pm \sqrt{54.125} \]

\[ t = -7.4 \text{ seconds} \]

\[ t = 7.4 \text{ seconds} \]

Creating Perfect Square Trinomials

\[ 4x^2 + 12x + 9 \]

\[ (2x + 3)^2 \]
a) \( y^2 + 10y + 25 \)

\[
(y + 5)^2
\]

\( (y + 5)(y + 5) \)

\( y^2 + 10y + 25 \)

y^2 + 10y + 25

b) \( x^2 - 8x + 16 \)

\[
(x - 4)^2
\]

\( (x - 4)^2 \)

c) \( z^2 - 2z + 1 \)

\[
(z - 1)^2
\]

\( (z - 1)^2 \)

Pattern: Take middle term coefficients, cut it in half, and square it. Only works if \( x^2 + bx + \_

(\text{coefficient of } 1) \)
\[ x^2 + 11x + \_ \]

\[ \left( \frac{b}{2} \right)^2 = \left( \frac{11}{2} \right)^2 \]

\[ x^2 + 11x + \frac{121}{4} \]

\[ x^2 + 11x + \underline{30.25} \]