Quadratic Equation: If It Doesn't Factor Nicely

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

$$3x^2 + 4x - 2 = 0$$

$a = 3$, $b = 4$, $c = -2$

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

$$\frac{-4 \pm \sqrt{16 + 24}}{6}$$

$$\frac{-4 \pm \sqrt{40}}{6}$$

$$-\frac{2}{3} \pm \frac{\sqrt{10}}{3}$$

$$\boxed{x = \frac{-2 \pm \sqrt{10}}{3}}$$

Use Substitution To Produce Quadratic Equation

$$x^{10} + 7x^5 + 10 = 0$$

$$(x^5)^2 + 7(x^5) + 10 = 0$$

$$y = x^5$$

$$(y^2) + 7(y) + 10 = 0$$

$$y^2 + 7y + 10 = 0$$

$$(y+5)(y+2) = 0$$

$y + 5 = 0$

$-5 = -5$

$y = -5$

$y + 2 = 0$

$-2 = -2$

$y = -2$

$y = x^5$

$\sqrt[5]{x^5} = \sqrt[5]{-5}$

$x = \sqrt[5]{-5}$

$\sqrt[5]{x^5} = \sqrt[5]{-2}$

$x = \sqrt[5]{-2}$