We will

- review how to solve quadratic equations,
- extend these techniques to special, non-quadratics, and
- learn to recognize these forms.
Solve each of the following.

- $3(x - 1)^2 + 5 = 53$.
- $x^2 - 7x + 12 = 0$.
- $x^2 - 4x + 1 = 0$. 
Solve the following using the same technique as the first quadratic. $4(x - 5)^3 - 7 = -39$.

Can $x^4 - 7x^2 + 12 = 0$ be solved using the same technique as the second quadratic?

What is the relationship between $x^2$ (2nd term) and $x^4$ (first term)?

Re-write this quadratic by replacing $x^2$ with $u$ (that is $u = x^2$).
\[2x^6 - 7x^3 + 3 = 0.\]
\[2(x^3)^2 - 7(x^3) + 3 = 0.\] Recognize the hidden quadratic.
\[u = x^3.\] Setup the substitution.
\[2u^2 - 7u + 3 = 0.\] Substitute.
\[(2u - 1)(u - 3) = 0.\] Solve by factoring.
\[u = 1/2, 3.\] Finish solving.
\[ u = \frac{1}{2}. \]
\[ x^3 = \frac{1}{2}. \text{ Undo substitution.} \]
\[ \sqrt[3]{x^3} = \sqrt[3]{\frac{1}{2}}. \text{ Finish solving.} \]
\[ x = \frac{1}{\sqrt[3]{2}}. \]

\[ u = 3. \]
\[ x^3 = 3. \]
\[ \sqrt[3]{x^3} = \sqrt[3]{3}. \]
\[ x = \sqrt[3]{3}. \]
Which of the following can be solved using this type of substitution?

- $x^4 - 3x^2 - 10 = 0$.
- $x^{10} - 3x^5 - 10 = 0$.
- $x^4 - 3x^3 - 10 = 0$.
- $x^{2/3} - 3x^{1/3} - 10 = 0$.
- $x^3 - 3x^{3/2} - 10 = 0$. 