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Algebra II

Factoring Trinomials with Substitution

1. Rewrite the expression $(x^2 + 5x)^2 - 2(x^2 + 5x) - 24$ as a product of four linear factors. $y = x^2 + 5x$

$$y^2 - 2y - 24 \rightarrow (x^2 + 5x - 6)(x^2 + 5x + 4)$$

$$(y - 6)(y + 4) \rightarrow (x + 6)(x - 1)(x + 4)(x + 1)$$

2. Rewrite the expression $(x^2 - 2x)^2 - 11(x^2 - 2x) + 24$ as a product of four linear factors.

$$y^2 - 11y + 24 \rightarrow (x^2 - 2x - 8)(x^2 - 2x - 3)$$

$$(y - 8)(y - 3) \rightarrow (x - 4)(x + 2)(x - 3)(x + 1)$$

3. Rewrite the expression $(x^2 - 3x)^2 - 14(x^2 - 3x) + 40$ as a product of four linear factors.

$$y^2 - 14y + 40 \rightarrow (x^2 - 3x - 10)(x^2 - 3x - 4)$$

$$(y - 10)(y - 4) \rightarrow (x - 5)(x + 2)(x - 4)(x + 1)$$

4. Rewrite the expression $(4x^2 + 5x)^2 - 5(4x^2 + 5x) - 6$ as a product of four linear factors.

$$y^2 - 5y - 6$$

$$(y - 6)(y + 1)$$

$$(4x^2 + 5x - 6)(4x^2 + 5x + 1)$$

$$\begin{array}{cc} x^2 + 5x - 24 & x^2 + 5x + 1 \\ (x + 8)(x - 3) & (x + 4)(x + 1) \\ \frac{4}{4} & \frac{4}{4} \end{array}$$

$$(x + 2)(4x - 3)(x + 1)(4x + 1)$$

$$y = 4x^2 + 5x$$

