

Grouping & Quadratic form

Grouping Examples:

1. $x^3 - 2x^2 - 9x + 18$

Solution:

$$\begin{aligned} & x^3 - 2x^2 - 9x + 18 \\ &= x^2(x - 2) - 9(x - 2) \\ &= (x^2 - 9)(x - 2) \end{aligned}$$

Then you can continue factoring with other techniques like, in this case, difference of squares:

$$= (x + 3)(x - 3)(x - 2)$$

General form of factoring by grouping

$$\begin{aligned} & ra + rb + sa + sb \\ &= r(a + b) + s(a + b) \\ &= (r + s)(a + b) \end{aligned}$$

(In the above example, $a = x$, $b = -2$, $r = x^2$, and $s = -9$.)

Quadratic form

Examples:

1. Factor $x^4 + 8x^2 + 16$

Solution:

$$\begin{aligned} & x^4 + 8x^2 + 16 \\ &= (x^2 + 4)^2 \end{aligned}$$

(We just treated x^2 like a variable and factored as if it were a quadratic.) Then we can go on with quadratic techniques, if any.

Quadratic form general form

Any expression of the form

$$au^2 + bu + c$$

where u is an expression involving a variable. Note that this is just a quadratic expression in standard form, but u may be a complicated expression (x^2 in this case).