

Factoring by grouping. Factor $x^3 - 5x^2 + 3x - 15$.

Solution. Group the first and second terms -- find their common factor.
Do the same with the third and fourth terms.

$$\begin{aligned}x^3 - 5x^2 + 3x - 15 &= x^2(x - 5) + 3(x - 5) \\ &= (x^2 + 3)(x - 5)\end{aligned}$$

Problem Factor by grouping.

$$\begin{aligned}\text{a) } x^3 + x^2 + 3x + 3 &= x^2(x + 1) + 3(x + 1) \\ &= (x^2 + 3)(x + 1)\end{aligned}$$

$$\begin{aligned}\text{b) } 2x^3 - 6x^2 + 5x - 15 &= 2x^2(x - 3) + 5(x - 3) \\ &= (2x^2 + 5)(x - 3)\end{aligned}$$

$$\begin{aligned}\text{c) } 3x^3 - 15x^2 - 2x + 10 &= 3x^2(x - 5) - 2(x - 5) \\ &= (3x^2 - 2)(x - 5)\end{aligned}$$

$$\begin{aligned}\text{d) } 12x^3 + 2x^2 - 18x - 3 &= 2x^2(6x + 1) - 3(6x + 1) \\ &= (2x^2 - 3)(6x + 1)\end{aligned}$$

$$\begin{aligned}\text{e) } x^3 + 2x^2 - x - 2 &= x^2(x + 2) - (x + 2) \\ &= (x^2 - 1)(x + 2)\end{aligned}$$

$$\begin{aligned}\text{f) } 12x^3 - 6x^2 - 2x + 1 &= 6x^2(2x - 1) - (2x - 1) \\ &= (6x^2 - 1)(2x - 1)\end{aligned}$$