

$$a^3 + a^2 - b^3 - b^2$$

$$\begin{aligned} a^3 + a^2 - b^3 - b^2 &= a^2 - b^2 + a^3 - b^3 = \\ (a+b)(a-b) + (a-b)(a^2 + ab + b^2) &= \\ (a-b)((a+b) + (a^2 + ab + b^2)) &= (a-b)(a+b+a^2+ab+b^2) \end{aligned}$$

$$(x+y)(x-y) = x^2 - y^2$$

$$(x^2 - xy + y^2)(x+y) = x^3 + y^3$$

$$(x^2 + xy + y^2)(x-y) = x^3 - y^3$$