

STEP/Polynomials Q2 (26/6/23)

Factorise (a) $x^3 - y^3$ (b) $x^3 + y^3$

Solution

(a) Let $f(x) = x^3 - y^3$

By the Factor theorem (treating $f(x)$ as a cubic in x), since

$f(y) = 0$, $(x - y)$ is a factor of $x^3 - y^3$, leading to

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

(b) Similarly, $(x + y)$ is a factor of $x^3 + y^3$, leading to

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