

Exercise 13

Differentiate.

$$y = \frac{x^2 + 1}{x^3 - 1}$$

SolutionUse the quotient rule to differentiate y .

$$\begin{aligned} y' &= \frac{d}{dx} \left(\frac{x^2 + 1}{x^3 - 1} \right) \\ &= \frac{\left[\frac{d}{dx}(x^2 + 1) \right] (x^3 - 1) - \left[\frac{d}{dx}(x^3 - 1) \right] (x^2 + 1)}{(x^3 - 1)^2} \\ &= \frac{(2x)(x^3 - 1) - (3x^2)(x^2 + 1)}{(x^3 - 1)^2} \\ &= \frac{-x^4 - 3x^2 - 2x}{(x^3 - 1)^2} \\ &= -\frac{x(x^3 + 3x + 2)}{(x^3 - 1)^2} \end{aligned}$$