

3.2.45 Find the first and second derivatives of

$$y = \frac{x^3 + 7}{x}$$

Solution

By the Quotient Rule (Theorem 3.3.14):

$$\frac{dy}{dx} = y' = \frac{[3x^2 + 0](x) - (x^3 + 7)[1]}{(x)^2}$$

$$= \frac{3x^3 - x^3 - 7}{x^2} = \boxed{\frac{2x^3 - 7}{x^2} = y'}$$

Next,

$$\boxed{\frac{d^2y}{dx^2} = y'' = \frac{[6x^2](x^2) - (2x^3 - 7)[2x]}{(x^2)^2}}$$

□