Exercise 7

Calculate y'.

$$y = \frac{t^4 - 1}{t^4 + 1}$$

Solution

Calculate y' by using the quotient rule.

$$\begin{aligned}
y' &= \frac{d}{dt}\left(\frac{t^4 - 1}{t^4 + 1}\right) \\
&= \frac{\left[\dfrac{d}{dt}(t^4 - 1)\right](t^4 + 1) - \left[\dfrac{d}{dt}(t^4 + 1)\right](t^4 - 1)}{(t^4 + 1)^2} \\
&= \frac{(4t^3)(t^4 + 1) - (4t^3)(t^4 - 1)}{(t^4 + 1)^2} \\
&= \frac{4t^3[(t^4 + 1) - (t^4 - 1)]}{(t^4 + 1)^2} \\
&= \frac{4t^3(2)}{(t^4 + 1)^2} \\
&= \frac{8t^3}{(t^4 + 1)^2}
\end{aligned}$$