

$$\begin{aligned}y &= \left(\frac{x^2 + 6}{x^2 - 6}\right)^4 \Rightarrow \\y' &= 4\left(\frac{x^2 + 6}{x^2 - 6}\right)^3 \cdot \frac{d}{dx}\left(\frac{x^2 + 6}{x^2 - 6}\right) = 4\left(\frac{x^2 + 6}{x^2 - 6}\right)^3 \cdot \frac{(x^2 - 6)(2x) - (x^2 + 6)(2x)}{(x^2 - 6)^2} \\&= 4\left(\frac{x^2 + 6}{x^2 - 6}\right)^3 \cdot \frac{2x[x^2 - 6 - (x^2 + 6)]}{(x^2 - 6)^2} = 4\left(\frac{x^2 + 6}{x^2 - 6}\right)^3 \cdot \frac{2x(-12)}{(x^2 - 6)^2} \\&= \frac{-96x(x^2 + 6)^3}{(x^2 - 6)^5}\end{aligned}$$