

Exercise 11

Differentiate.

$$F(y) = \left(\frac{1}{y^2} - \frac{3}{y^4} \right) (y + 5y^3)$$

SolutionUse the product rule to differentiate $J(v)$.

$$\begin{aligned} F'(y) &= \frac{d}{dy} [(y^{-2} - 3y^{-4})(y + 5y^3)] \\ &= \left[\frac{d}{dy} (y^{-2} - 3y^{-4}) \right] (y + 5y^3) + (y^{-2} - 3y^{-4}) \left[\frac{d}{dy} (y + 5y^3) \right] \\ &= (-2y^{-3} + 12y^{-5})(y + 5y^3) + (y^{-2} - 3y^{-4})(1 + 15y^2) \\ &= (-2y^{-2} - 10 + 12y^{-4} + 60y^{-2}) + (y^{-2} + 15 - 3y^{-4} - 45y^{-2}) \\ &= 14y^{-2} + 5 + 9y^{-4} \end{aligned}$$