

Exercise 20

Find the derivative of the function.

$$F(t) = (3t - 1)^4(2t + 1)^{-3}$$

Solution

Take the derivative using the product rule and the chain rule.

$$\begin{aligned} F'(t) &= \frac{dF}{dt} = \frac{d}{dt}[(3t - 1)^4(2t + 1)^{-3}] \\ &= \left[\frac{d}{dt}(3t - 1)^4 \right] (2t + 1)^{-3} + (3t - 1)^4 \left[\frac{d}{dt}(2t + 1)^{-3} \right] \\ &= \left[4(3t - 1)^3 \cdot \frac{d}{dt}(3t - 1) \right] (2t + 1)^{-3} + (3t - 1)^4 \left[-3(2t + 1)^{-4} \cdot \frac{d}{dt}(2t + 1) \right] \\ &= [4(3t - 1)^3 \cdot (3)] (2t + 1)^{-3} + (3t - 1)^4 [-3(2t + 1)^{-4} \cdot (2)] \\ &= 12(3t - 1)^3(2t + 1)^{-3} - 6(3t - 1)^4(2t + 1)^{-4} \\ &= 6(3t - 1)^3(2t + 1)^{-4}[2(2t + 1) - (3t - 1)] \\ &= 6(3t - 1)^3(2t + 1)^{-4}(t + 3) \end{aligned}$$