

Problem 42, Section 5.5

Use logarithmic differentiation to find the derivative of $y = (3x + 2)^4(5x - 1)^2$.

Well,

$$\ln(y) = \ln((3x + 2)^4(5x - 1)^2) = 4 \ln(3x + 2) + 2 \ln(5x - 1).$$

Therefore,

$$(\ln y)' = \frac{y'}{y} = 4 \frac{3}{3x + 2} + 2 \frac{5}{5x - 1} = \frac{12}{3x + 2} + \frac{10}{5x - 1}.$$

To solve for y' , we need to multiply both sides of the above equation by y . So we get

$$y' = \left[\frac{12}{3x + 2} + \frac{10}{5x - 1} \right] y = \left[\frac{12}{3x + 2} + \frac{10}{5x - 1} \right] ((3x + 2)^4(5x - 1)^2).$$