

Calculus I, Section 3.4, #38  
The Chain Rule

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Find the derivative of the function.<sup>1</sup>

$$y = \sqrt{1 + xe^{-2x}}$$

$$y = \sqrt{1 + xe^{-2x}} = (1 + xe^{-2x})^{1/2}$$

$$\begin{aligned} y' &= \frac{1}{2} \cdot (1 + xe^{-2x})^{1/2-1} \cdot \frac{d}{dx} [1 + xe^{-2x}] \\ &= \frac{1}{2} (1 + xe^{-2x})^{-1/2} \cdot (0 + x \cdot e^{-2x} \cdot -2 + e^{-2x} \cdot 1) \\ &= \frac{-2xe^{-2x} + e^{-2x}}{2(1 + xe^{-2x})^{1/2}} \\ &= \frac{e^{-2x}(-2x + 1)}{2\sqrt{1 + xe^{-2x}}} \end{aligned}$$

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<sup>1</sup>Stewart, *Calculus, Early Transcendentals*, p. 204, #38.