
Complete the following problems. Show all work to receive full credit.

1. Find the following derivatives:

(a) Find $\frac{dy}{dx}$ where $y = x^{(x+1)}$

$$\begin{aligned}\ln x &= (x+1) \ln x \\ \frac{1}{y} y' &= \ln x + \frac{x+1}{x} \\ y' &= x^{(x+1)} \left(\ln x + \frac{x+1}{x} \right)\end{aligned}$$

(b) $\frac{d}{dx} \left(3^{\log_2 x} \right)$

$$= 3^{\log_2 x} \cdot \ln 3 \cdot \frac{1}{x \ln 2}$$

(c) $\frac{d}{dx} (\sin^{-1} x)$

$$= \frac{1}{\sqrt{1-x^2}}$$