

1. Find the derivatives of the following functions at $x = 3$ given

$$f(3) = 6, f'(3) = 0, f(1) = 1, f'(1) = 5, g(3) = 1, g'(3) = 2, g(4) = 2, g'(4) = 1, h(3) = 4, \text{ and } h'(3) = 2$$

(a) $f(g(x)) \cdot h(x)$

(b) $\frac{f(x)}{g(h(x))}$

2.

(a) Find y' if

$$y = \tan(\cos(\cos(x^2)))$$

(b) Find $y^{(1123)}$ if

$$y = \sin^2 x$$

3. Using implicit differentiation show

(a) $\frac{d}{dx} [\sin^{-1} x] = \frac{1}{\sqrt{1-x^2}}$ Hint: Set $y = \sin^{-1} x$ solve for x and then differentiate.

(b) $\frac{d}{dx} [\ln x] = \frac{1}{x}$ Hint: Set $y = \ln x$ solve for x and then differentiate.

4. Given the following functions find y'

(a) $\cos y + \tan y^2 = \frac{x+1}{e^{x^2}}$

(b) $y^2 + y = \cot(3x+2)$