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

1. Find the derivatives of the following functions:

(a) $f(x) = \cos x \sin x$

$$\begin{aligned} f'(x) &= (-\sin x)(\sin x) + (\cos x)(\cos x) \\ &= -\sin^2 x + \cos^2 x \end{aligned}$$

(b) $g(x) = \frac{\sec x}{1 + \tan x}$

$$\begin{aligned} g'(x) &= \frac{\sec x \tan x (1 + \tan x) - \sec^2 x (\sec x)}{(1 + \tan x)^2} \\ &= \frac{\sec x \tan x + \sec x \tan^2 x - \sec^3 x}{(1 + \tan x)^2} \end{aligned}$$

(c) $h(x) = \csc x (\cot x + x^2)$

$$\begin{aligned} h'(x) &= -\csc x \cot x (\cot x + x^2) + (-\csc^2 x + 2x)(\csc x) \\ &= -\csc x \cot^2 x - x^2 \csc x \cot x - \csc^3 x + 3x \csc x \end{aligned}$$