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

1. Find the following derivatives:

(a) $\frac{d}{dx} (\sin x + \tan x - \sec x + 5e^x)$

$$= \cos x + \sec^2 x - \sec x \tan x + 5e^x$$

(b) $\frac{d}{dx} \left(\frac{x}{\cos x} + \csc x \cdot \cot x \right)$

$$= \frac{\cos x + x \sin x}{\cos^2 x} - \csc x \cot x \cdot \cot x - \csc^2 x \cdot \csc x$$

$$= \frac{\cos x + x \sin x}{\cos^2 x} - \csc x \cot^2 x - \csc^3 x$$

2. Find the equation of the line tangent to $y = 1 + \cos x$ at $x = \frac{\pi}{2}$.

$$y' = -\sin x$$

$$y' \left(\frac{\pi}{2} \right) = -\sin \frac{\pi}{2} = -1 = m$$

$$y \left(\frac{\pi}{2} \right) = 1 + \cos \frac{\pi}{2} = 1 + 0 = 1$$

$$y - 1 = - \left(x - \frac{\pi}{2} \right)$$