

1. Determine the derivative of each:

a. $f(x) = \frac{\sin x}{x^2}$

b. $f(x) = \frac{1}{2} \sin^2(5x) + \tan x - 1$

c. $f(x) = \sec x \csc x$

d. $f(x) = \tan \sqrt[3]{6x+1}$

2. Determine $\frac{dy}{dx}$ given: $x \cos(xy) = y \sin(3x)$

3. Determine the equation of the tangent line of $y = \frac{\cos(3x)}{\sin(2x)}$ at $x = \frac{\pi}{3}$

4. The position of a particle as it moves horizontally is described by the equation $s = 2\sin t - \cos t$, $0 \leq t \leq 2\pi$, where s is displacement in metres and t is the time in seconds. Find the absolute maximum and minimum displacements.