Monday Night Calculus

Derivatives of Trigonometric Functions

9/28 Question

1. Let $f(x) = 2x \sin x$.

   (a) Find an equation of the tangent line to the graph of f at the point $\left(\dfrac{\pi}{2}, \pi\right)$.

   (b) Illustrate your answer to part (a) by graphing f and the tangent line in the same viewing window.

2. Suppose $f\left(\dfrac{\pi}{3}\right) = -4$ and $f'\left(\dfrac{\pi}{3}\right) = 3$.

   Let $g(x) = f(x) \sin x$, $h(x) = \dfrac{\cos x}{f(x)}$, and $j(x) = (g \circ h)(x)$.

   (a) Find $g'\left(\dfrac{\pi}{3}\right)$.

   (b) Find $h'\left(\dfrac{\pi}{3}\right)$.

   (c) Find $j'\left(\dfrac{\pi}{3}\right)$.

3. A particle moves along a horizontal line so that its position at time t, $t \geq 0$, is given by

$$s(t) = 4 \cos t \sin t - 4 \sin t$$

   Find the first value of $t > 0$ for which the particle is at rest.