SOLUTION In order to apply Equation 2, we first rewrite the function by multiplying and dividing by 7:

Note that $\sin 7x \neq 7 \sin x$.

$$\frac{\sin 7x}{4x} = \frac{7}{4}\left(\frac{\sin 7x}{7x}\right)$$

Notice that as $x \to 0$, we have $7x \to 0$, and so, by Equation 2 with $\theta = 7x$,

$$\lim_{x \to 0} \frac{\sin 7x}{4x} = \lim_{x \to 0} \frac{\sin(7x)}{4x}$$

25. (a) Find an equation of the tangent line to the curve $y = x \cos x$ at the point $(\pi, -\pi)$.

(b) Illustrate part (a) by graphing the curve and the tangent line on the same screen.

26. (a) Find an equation of the tangent line to the curve $y = \sec x - 2 \cos x$ at the point $(\pi/3, 1)$.

(b) Illustrate part (a) by graphing the curve and the tangent

34. An object with weight W is dragged along a horizontal plane by a force acting along a rope attached to the object. If the rope makes an angle θ with the plane, then the magnitude of the force is

$$F = \frac{\mu W}{\mu \sin \theta + \cos \theta}$$

27. (a) If $f(x) = 2x + \cot x$, find $f'(x)$.

(b) Check to see that your answer to part (a) is reasonable by graphing both f and f' for $0 < x < \pi$.

28. (a) If $f(x) = \sqrt{x} \sin x$, find $f'(x)$.

(b) Check to see that your answer to part (a) is reasonable by graphing both f and f' for $0 \leq x \leq 2\pi$.

29. For what values of x does the graph of $f(x) = x + 2 \sin x$ have a horizontal tangent?

30. Find the points on the curve $y = (\cos x)/(2 + \sin x)$ at which the tangent is horizontal.

(a) Find the rate of change of F with respect to θ.

(b) When is this rate of change equal to 0?

(c) If $W = 50$ lb and $\mu = 0.6$, draw the graph of F as a function of θ and use it to locate the value of θ for which $dF/d\theta = 0$. Is the value consistent with your answer to part (b)?

35–44 □ Find the limit.

35. $\lim_{t \to 0} \dfrac{\sin 5t}{t}$

36. $\lim_{t \to 0} \dfrac{\sin 8t}{\sin 9t}$