

Keeper 4.4 Virtual Problems - Derivative of Trigonometric Functions

Find the derivative of each function.

1. $f(x) = (x^2 + 1) \sec x$

2. $f(x) = \frac{\sec x}{1 + \tan x}$

3. $f(x) = x \cos x$

4. $f(x) = \csc x$

5. $f(x) = x \sin x - 3 \cos x$

6. $f(x) = x^2 \cos x + 4 \sin x$

Find an equation of the tangent line to the curve at the given point.

7. $y = \sec x, \left(\frac{\pi}{3}, 2\right)$

8. $y = e^x \cos x, (0, 1)$

9-10: Suppose $f\left(\frac{\pi}{3}\right) = 4$ and $f'\left(\frac{\pi}{3}\right) = -2$ and let $g(x) = f(x) \cdot \sin x$ and $h(x) = \frac{\cos x}{f(x)}$. Find

9. $g'\left(\frac{\pi}{3}\right)$

10. $h'\left(\frac{\pi}{3}\right)$

11-12: For what values of x does the graph of f have a horizontal tangent?

11. $f(x) = x + 2 \sin x$

12. $f(x) = e^x \cos x$

13. Evaluate $\frac{d^{99}}{dx^{99}}(\sin x)$

Keeper 4.5 Virtual Problems – The Chain Rule

1-8: Find the Derivative of the function

1. $f(x) = \sqrt{1 - 2x}$

2. $f(x) = \frac{1}{(1 + \sec x)^2}$

3. $f(t) = \sin(e^t) + e^{\sin t}$

4. $y = \cos(a^3 + x^3), a = \text{some constant}$

5. $y = xe^{-kx}, k = \text{some constant}$

6. $y = a^3 + \cos^3 x, a = \text{some constant}$

7. $g(x) = (x^2 + 1)^3(x^2 + 2)^6$

8. $h(t) = (t + 1)^{\frac{2}{3}}(2t^2 - 1)^3$

9-12: Find the equation of the tangent line to the curve at the given point.

9. $y = (1 + 2x)^{10}, (0, 1)$

10. $y = \sqrt{1 + x^3}, (2, 3)$

11. $y = \sin(\sin x), (\pi, 0)$

12. $y = \sin x + \sin^2 x, (0, 0)$

13-14: A table of values for f , g , f' , and g' is given.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
1	3	2	4	6
2	1	8	5	7
3	7	2	7	9

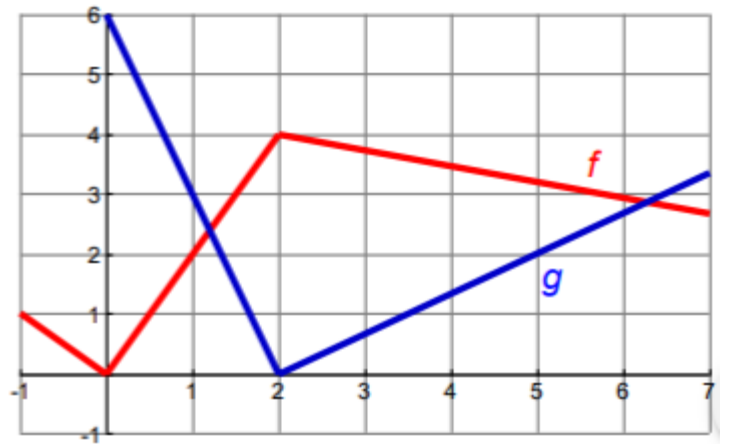
13. $h(x) = f(g(x))$, find $h'(1)$

14. $H(x) = g(f(x))$, find $H'(1)$

15-17: If f and g are the functions whose graphs are shown. Let $u(x) = f(g(x))$, $v(x) = g(f(x))$, and $w(x) = g(g(x))$. Find each derivative, if it exists. If it does not exist, explain why.

15. $u'(1)$

16. $v'(1)$



17. $w'(1)$