

Problems for Gateway #3: Derivatives of Sine and Cosine

1. Find the derivative of: $f(x) = 1 + 2 \cdot \sin(x)$.
2. Find the derivative of: $k(t) = \sin(-x) + 8$.
3. Find the derivative of: $p(t) = 3 + 4 \cdot \cos(2 \cdot t)$.
4. Find the derivative of: $g(y) = 14 - 3 \cdot \cos(y)$.
5. Find the derivative of: $r(x) = 8 + 2 \cdot \sin(3 \cdot x)$.
6. Find the derivative of: $u(t) = 2 \cdot \sin(t) - \cos(2 \cdot t)$.
7. Find the derivative of: $p(x) = 3 \cdot \cos(-x) + 2$.
8. Find the derivative of: $v(t) = \cos(3 - t) + 3 \cdot \sin(t)$.
9. Find the derivative of: $w(x) = 9 \cdot \sin(3 \cdot t) + 3 \cdot \sin(9 \cdot t)$.
10. Find the derivative of: $m(t) = 10 \cdot \cos(4 \cdot t) - 4 \cdot \cos(10 \cdot t)$.
11. Find the derivative of: $g(t) = t^7 \cdot \cos(t)$.
12. Find the derivative of: $n(x) = \ln(x) \cdot \cos(x)$.
13. Find the derivative of: $f(x) = 2^x \cdot \sin(x)$.
14. Find the derivative of: $p(t) = t^2 \cdot \cos(t)$.
15. Find the derivative of: $g(x) = \sin(x) \cdot x^4$.
16. Find the derivative of: $p(x) = \frac{\sin(x)}{\cos(x)}$.
17. Find the derivative of: $f(x) = \frac{\cos(x)}{\sin(x)}$.
18. Find the derivative of: $m(x) = \frac{x^2}{1 + (\sin(x))^2}$.

19. Find the derivative of: $w(z) = \frac{\cos(z)}{1-z^2}$.
20. Find the derivative of: $f(x) = \sqrt{1 + \cos(x)}$.
21. Find the derivative of: $f(x) = \sin(1 + x^2)$.
22. Find the derivative of: $g(t) = [\cos(t)]^2$.
23. Find the derivative of: $k(x) = \sin(1 + 2x + 3x^2)$.
24. Find the derivative of: $j(x) = \sin(x^2) + \cos(x^2)$.
25. Find the derivative of: $p(t) = [\sin(t)]^2 + [\cos(t)]^2$.
26. Find the derivative of: $q(x) = [\sin(x) + \cos(x)]^2$.
27. Find the derivative of: $m(t) = (2 + 3 \cdot \sin(t))^{10}$.
28. Find the derivative of: $r(x) = (x + \sin(x) + \cos(x))^{12}$.
29. Find the derivative of: $q(x) = \cos(1 + x^2 + x^3)$.
30. Find the derivative of: $u(z) = \sin(1 + \cos(z))$.

Answers:

1. $f'(x) = 2 \cdot \cos(x)$.
2. $k'(t) = -\cos(-x)$.
3. $p'(t) = -8 \cdot \sin(2 \cdot t)$.
4. $g'(y) = 3 \cdot \sin(y)$.
5. $r'(x) = 6 \cdot \cos(3 \cdot x)$.
6. $u'(t) = 2 \cdot \cos(t) + 2 \cdot \sin(2 \cdot t)$.
7. $p'(x) = 3 \cdot \sin(-x)$.
8. $v'(t) = \sin(3 - t) + 3 \cdot \cos(t)$.
9. $w'(x) = 27 \cdot \cos(3 \cdot t) + 27 \cdot \cos(9 \cdot t)$.
10. $m'(t) = -40 \cdot \sin(4 \cdot t) + 40 \cdot \sin(10 \cdot t)$.
11. $g'(t) = 7t^6 \cdot \cos(t) - t^7 \cdot \sin(t)$.

12. $n'(x) = (1/x) \cdot \cos(x) - \ln(x) \cdot \sin(x).$
13. $f'(x) = \ln(2) \cdot 2^x \cdot \sin(x) + 2^x \cdot \cos(x).$
14. $p'(t) = 2t \cdot \cos(t) - t^2 \cdot \sin(t).$
15. $g'(x) = \cos(x) \cdot x^4 + \sin(x) \cdot 4x^3.$
16. $p'(x) = \frac{1}{[\cos(x)]^2}$
17. $f'(x) = \frac{-\sin^2(x) - \cos^2(x)}{\sin^2(x)}$
18. $m'(x) = \frac{2x(1 + [\sin(x)]^2) - 2x^2 \cdot \sin(x) \cdot \cos(x)}{[1 + [\sin(x)]^2]^2}$
19. $w'(z) = \frac{-\sin(z)(1 - z^2) - \cos(z)(-2z)}{(1 - z^2)^2}$
20. $f'(x) = \frac{1}{2} \cdot (1 + \cos(x))^{\frac{-1}{2}} \cdot (-\sin(x))$
21. $f'(x) = \cos(1 + x^2) \cdot 2x.$
22. $g'(t) = 2 \cdot \cos(t) \cdot \sin(t).$
23. $k'(x) = \cos(1 + 2x + 3x^2) \cdot (2 + 6x).$
24. $j'(x) = \cos(x^2) \cdot 2x - \sin(x^2) \cdot 2x.$
25. $p'(t) = 2 \cdot \sin(t) \cdot \cos(t) - 2 \cdot \sin(t) \cdot \cos(t).$
26. $q'(x) = 2 \cdot [\sin(x) + \cos(x)] \cdot [\cos(x) - \sin(x)].$
27. $m'(t) = 10 \cdot (2 + 3 \cdot \sin(t))^9 \cdot (3 \cdot \cos(t)).$
28. $r'(x) = 12 \cdot (x + \sin(x) + \cos(x))^{11} \cdot (1 + \cos(x) - \sin(x)).$
29. $q'(x) = -\sin(1 + x^2 + x^3) \cdot (2x + 3x^2).$
30. $u'(z) = \cos(1 + \cos(z)) \cdot (-\sin(z)).$