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: $p(x) = \dfrac{\sin(x)}{\cos(x)}$.

17.   Find the derivative of: $f(x) = \dfrac{\cos(x)}{\sin(x)}$.

18.   Find the derivative of: $m(x) = \dfrac{x^2}{1 + \left(\sin(x)\right)^2}$.

19. Find the derivative of: $w(z) = \dfrac{\cos(z)}{1 - z^2}$.

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. $\quad n'(x) = (1/x)\cdot\cos(x) - \ln(x)\cdot\sin(x).$

13. $\quad f'(x) = \ln(2)\cdot 2^x\cdot\sin(x) + 2^x\cdot\cos(x).$

14. $\quad p'(t) = 2t\cdot\cos(t) - t^2\cdot\sin(t).$

15. $\quad g'(x) = \cos(x)\cdot x^4 + \sin(x)\cdot 4x^3.$

16. $\quad p'(x) = \dfrac{1}{[\cos(x)]^2}$

17. $\quad f'(x) = \dfrac{-\sin^2(x) - \cos^2(x)}{\sin^2(x)}$

18. $\quad m'(x) = \dfrac{2x\cdot\left(1+[\sin(x)]^2\right) - 2x^2\cdot\sin(x)\cdot\cos(x)}{\left[1+[\sin(x)]^2\right]^2}$

19. $\quad w'(z) = \dfrac{-\sin(z)\cdot\left(1-z^2\right) - \cos(z)\cdot(-2z)}{\left(1-z^2\right)^2}$

20. $\quad f'(x) = \frac{1}{2}\cdot\left(1+\cos(x)\right)^{\frac{-1}{2}}\cdot\left(-\sin(x)\right)$

21. $\quad f'(x) = \cos(1 + x^2)\cdot 2x.$

22. $\quad g'(t) = 2\cdot\cos(t)\cdot\sin(t).$

23. $\quad k'(x) = \cos(1 + 2x + 3x^2)\cdot(2 + 6x).$

24. $\quad j'(x) = \cos(x^2)\cdot 2x - \sin(x^2)\cdot 2x.$

25. $\quad p'(t) = 2\cdot\sin(t)\cdot\cos(t) - 2\cdot\sin(t)\cdot\cos(t).$

26. $\quad q'(x) = 2\cdot[\sin(x) + \cos(x)]\cdot[\cos(x) - \sin(x)].$

27. $\quad m'(t) = 10\cdot(2 + 3\cdot\sin(t))^{10}\cdot(3\cdot\cos(t)).$

28. $\quad r'(x) = 12\cdot(x + \sin(x) + \cos(x))^{11}\cdot(1 + \cos(x) - \sin(x)).$

29. $\quad q'(x) = -\sin(1 + x^2 + x^3)\cdot(2x + 3x^2).$

30. $\quad u'(z) = \cos(1 + \cos(z))\cdot(-\sin(z)).$