

MATH 251 EXTRA DIFFERENTIATION WORKSHEET

This is a collection of extra practice differentiation problems, for which a solution sheet (showing steps) exists.

1. Find $\frac{dy}{dx}$ for $y = 2c(x^4 + 7)(3x^6 - 2)$, where c is a constant.
2. Find $f'(x)$, where $f(x) = \frac{x}{x^2 + p^2}$, and where p is a constant.
3. Differentiate $f(x) = 3 \arcsin(cx^{1/3}) + \frac{\ln(x)}{2} + \sqrt{\pi}$, where c is a constant.
4. Differentiate $h(x) = 2 \tan(cx + d) + \frac{x}{\sin(x)} + \frac{2}{11}$, where c and d are constants.
5. Differentiate $g(a) = c \arctan(2a^{7/3})$, where c is a constant.
6. Differentiate $f(t) = \sqrt{a + \arcsin(t)} + \pi^3$, where a is a constant.
7. Differentiate $f(t) = \sqrt[3]{ct + \arctan(t)} + e^3$, where c is a constant.
8. Differentiate $y = x \tan(2x) + 3\sqrt{x} - \frac{1}{2}$.
9. Differentiate the function $q(x) = \cos(cx e^x + 7\pi^2)$, where c is a constant.
10. Differentiate $y = \frac{x}{\arctan(kx)} + \frac{\sqrt{\pi}}{2}$, where k is a constant.
11. Differentiate $f(x) = \left(\left((x^2 + \pi^2)^7 + \frac{9}{7} \right)^3 - 1 \right)^{100}$
12. Differentiate $w(t) = \arctan(\sqrt{3t+1}) - \ln(2\pi)$.
13. Let f be a function such that $f'(x) = 6e^x - 7f(x)$. Find the derivative of the function $h(z) = \frac{f(z)}{3z}$. (Your answer might involve the function f .)
14. Let g be a function such that $g'(x) = e^{x^2} - e^x$. Find the derivative of the function $h(t) = t + \pi^2 - g(t)$. (Your answer might involve the function g .)
15. Let f be a function such that $f'(x) = 6x f(x)$. Find the derivative of the function $w(x) = f(\sqrt{7})$. (Your answer might involve the function f .)
16. Differentiate $f(x) = x^2 g(x) + \sqrt{\pi}$, where g is a function such that $g'(x) = \sqrt[3]{3x^2 - 6} - 13$. (Your answer might involve the function g .)

17. Let h be a function such that $h'(x) = \frac{\sin(3x)}{x}$. Find the derivative $\frac{d}{dt} \left(\frac{\sin(3t)}{h(t)} \right)$. (Your answer might involve the function h .)
18. Let g be a function such that $g'(z) = e^{2z} - g(z)$. Find the derivative of the function $h(t) = 6g(2t+1)$. (Your answer might involve the function g .)
19. Let f be a function such that $f'(x) = (2x^2 + \sqrt{3})^{117}$. Find the derivative of the function $g(t) = f(t + \cos(t))$. (Your answer might involve the function f .)
20. Let g be a function such that $g'(x) = 3x + \frac{1}{\cos(x) + 9} + \ln(2)$. Find the derivative of the function $h(x) = g(2 - x)$. (Your answer might involve the function g .)
21. Let q be a function such that $q'(x) = xq(x)$. Find the derivative of the function $f(x) = q(2x + \sin(3))$. (Your answer might involve the function q .)
22. Let f be a function such that $f'(x) = \sqrt[3]{x^2 + 9} - 11$. Find the derivative of the function $h(x) = f(1 - x) + \pi^3$. (Your answer might involve the function f .)
23. Let f be a function such that $f'(x) = \sqrt{x^3 + 7} + 6$. Find the derivative of the function $g(t) = f(3t) + \sqrt{2}$. (Your answer might involve the function f .)
24. Differentiate $q(x) = \frac{7}{11} - 3f(\sin(x))$, given that $f'(x) = \sqrt[3]{1 + x^2}$. (Your answer might involve the function f .)
25. Let h be a function such that $h'(s) = 2s + \frac{1}{\sin(s) + 7} + e^4$. Find the derivative of the function $g(t) = \ln(h(t))$. (Your answer might involve the function h .)
26. Let f be a function such that $f'(x) = f(x) - \sin(2x)$. Find the derivative of the function $h(y) = [f(y)]^2$. (Your answer might involve the function f .)
27. Let f be a function such that $f'(x) = e^{-x^2}$. Find the derivative of the function $g(t) = tf(2t)$. (Your answer might involve the function f .)
28. Let q be a function such that $q'(x) = (2x^2 + \sqrt{11})^{98}$. Find the derivative of the function $g(t) = q(\cos(2t))$. (Your answer might involve the function q .)
29. Let h be a function such that $h'(t) = -11h(t)$. Find the derivative of the function $f(t) = h(\sin^2(t))$. (Your answer might involve the function h .)
30. Differentiate $y = \cos(2g(x)) - \frac{2}{\pi}$, where $g'(t) = \sqrt[3]{t^2 + 1}$. (Your answer might involve the function g .)
31. Differentiate Let g be a function such that $g'(t) = \sqrt[3]{t^2 + 1}$. Find the derivative of the function $f(x) = e^{xg(x)+1}$. (Your answer might involve the function g .)
32. Let h be a function such that $h'(x) = \frac{\sin(2x)}{x}$. Find the derivative of the function $f(x) = 3x^2h(x + \ln(7))$. (Your answer might involve the function h .)