Differentiation Practice

Math 1110
March 10, 2017

Find the derivative of each function. Simplify your final answer. In some cases, it may be useful to simplify/rewrite the function before differentiating.

(1) $y = \dfrac{1}{4\sin(x-3)}$

Solution: $\dfrac{-\cos(x-3)}{4\sin^2(x-3)}$

(2) $y = (4t-3)^{-8}$

Solution: $-32(4t-3)^7$

(3) $f(\theta) = \theta + 2\tan\left(\sqrt[3]{\theta}\right)$

Solution: $1 + \dfrac{2\sec^2\left(\sqrt[3]{\theta}\right)}{3\sqrt[3]{\theta^2}}$

(4) $g(z) = \sqrt[3]{2z-1}$

Solution: $\dfrac{1}{3}(2z-1)^{-2/3}$

(5) $h(\alpha) = (4\alpha\cos(\alpha))^2$

Solution: $32\alpha\cos(\alpha)\left(\cos(\alpha) - \alpha\sin(\alpha)\right)$

(6) $y = (4x^3 - 5x^2 + 10x - 13)^3$

Solution: $3(4x^3 - 5x^2 + 10x - 13)^2(12x^2 - 10x + 10)$

(7) $f(x) = 3\left(2e^{5x}\right)^3(x-1)^4$

Solution: $360e^{15x}(x-1)^4 + 96e^{15x}(x-1)^3$

(8) $g(t) = \dfrac{(t-3)^2}{\sqrt{t+1}}$

Solution: $\dfrac{2(t+3)\sqrt{t-1} - \frac{1}{2}(t-3)^2\frac{1}{\sqrt{t+1}}}{|t+1|}$

(9) $y = \left(\dfrac{4^{2x-1}}{3-x}\right)^3$

Solution: $3\left(\dfrac{4^{2x-1}}{3-x}\right)^2\left(\dfrac{(3-x)(4^{2x-1})\cdot 2\cdot\ln 4 + 4^{2x-1}}{3-x}\right)$