Practice Quiz Derivatives 2018 Name Answers

Introduction to Calculus

Find the derivative of each function. Simplify each answer.

1) $y(x) = x^4 - 6\sin(x) + 8(7)^x$

$y'(x) = 4x^3 - 6\cos(x) + 8(\ln 7)7^x$

2) $g(x) = e^x \cos(x)$

$g'(x) = (\ln e)e^x \cos x + e^x \cdot -\sin x$

$= e^x \cos x - e^x \sin x$

or $e^x(\cos(x) - \sin(x))$

3) $J(x) = \frac{1}{2}(6)^{8x-1}$

$J'(x) = \frac{1}{2} \cdot (\ln 6) \cdot 6^{8x-1} \cdot 8$

$= 4 \ln 6 \cdot 6^{8x-1}$

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

$f'(x) = \frac{0 - 1 \cdot \frac{1}{2}(2x-1)^{-\frac{1}{2}} \cdot 2}{\left((2x-1)^{1/2}\right)^2}$

$= \frac{-(2x-1)^{-1/2}}{(2x-1)^1} \Rightarrow \boxed{-(2x-1)^{-3/2}}$

5) $y = \frac{5x^{2/3}}{7} = \frac{5}{7}x^{\frac{2}{3}}$

$\frac{dy}{dx} = \frac{10}{21}x^{-\frac{1}{3}}$

6) $f(x) = 2\sqrt{10x}$ (Careful: Use chain rule!)

$f(x) = 2(10x)^{1/2}$

$f'(x) = 2 \cdot \frac{1}{2}(10x)^{-1/2} \cdot 10$

$= \frac{10}{\sqrt{10x}}$ or write $10(10x)^{-1/2}$

or write $\frac{10}{(10x)^{1/2}}$

7) $f(x) = \frac{-3}{2x^4} = -\frac{3}{2}x^{-4}$

$f'(x) = 6x^{-5}$

or write

$\frac{6}{x^5}$

8) $f(x) = \dfrac{(7x^2 - x + 5)^4}{2} = \dfrac{1}{2}(7x^2 - x + 5)^4$

$$f'(x) = 2(7x^2 - x + 5)^3(14x - 1)$$

9) $f(x) = \tan^4(3x-1) = (\tan(3x-1))^4$

$$f'(x) = 4(\tan(3x-1))^3 \cdot \sec^2(3x-1) \cdot 3$$

$$f'(x) = 12\tan^3(3x-1) \cdot \sec^2(3x-1)$$

10) $y(x) = \dfrac{(2)^{3x}}{(6-2x)^3}$ $\qquad \dfrac{A'B - AB'}{B^2}$

$$y'(x) = \frac{(\ln 2)2^{3x} \cdot 3 \cdot (6-2x)^3 - 2^{3x} \cdot 3(6-2x)^2(-2)}{((6-2x)^3)^2}$$

$$= \frac{\cancel{(6-2x)^2}\left(3(\ln 2)2^{3x}(6-2x) + 6 \cdot 2^{3x}\right)}{(6-2x)^{\cancel{6}\,4}}$$

$$y'(x) = \frac{3\ln 2 \cdot 2^{3x}(6-2x) + 6 \cdot 2^{3x}}{(6-2x)^4}$$ or factor more $$y'(x) = \frac{3 \cdot 2^{3x}((\ln 2)(6-2x) + 2)}{(6-2x)^4}$$

Find the derivative of each function. Do NOT simplify answers.

11) $f(x) = 2x^3(6x^3 - x)^3$

$A' \cdot B + A \cdot B'$

$f'(x) = 6x^2(6x^3 - x)^3 + 2x^3 \cdot 3(6x^3 - x)^2(18x^2 - 1)$

12) $f(x) = \dfrac{(5x^6 - 8)^4}{5^{3x-2}}$

$\dfrac{A'B - AB'}{B^2}$

$$f'(x) = \frac{4(5x^6-8)^3(30x^5) \cdot 5^{3x-2} - (5x^6-8)^4 \cdot \ln 5 \cdot 5^{3x-2} \cdot 3}{\left(5^{3x-2}\right)^2}$$

13) $f(x) = \left(\dfrac{\sin x}{9x^2 + 1}\right)^{12}$

$$f'(x) = 12\left(\frac{\sin x}{9x^2+1}\right)^{11}\left(\frac{(\cos x) \cdot (9x^2+1) - (\sin x)(18x)}{(9x^2+1)^2}\right)$$

$\boxed{\text{or}}$ if you rewrite $f(x)$ as $f(x) = \dfrac{(\sin x)^{12}}{(9x^2+1)^{12}}$ the deriv. is

$$f'(x) = \frac{12(\sin x)^{11} \cdot \cos x \cdot (9x^2+1)^{12} - (\sin x)^{12} \cdot 12(9x^2+1)^{11} \cdot 18x}{((9x^2+1)^{12})^2}$$

A · B · C

14) $f(x) = \cos(3x)\cdot(4x-1)^6\cdot(2^x)$

A'BC + AB'C + ABC'

$f'(x) = -\sin(3x)\cdot 3\cdot(4x-1)^6(2^x) + \cos(3x)\cdot 6(4x-1)^5\cdot 4\cdot 2^x + \cos(3x)\cdot(4x-1)^6\cdot \ln 2\cdot 2^x$