Differentiation Quiz ... Set 8

Find the derivative of each function. <u>**Simplify each answer.**</u>

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

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

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

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

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

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

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

Answers

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

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

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

OR $\to g'(x) = e^x(\cos(x) - \sin(x))$

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

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

$J'(x) = 4(\ln 6)6^{8x-1}$

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

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

$f'(x) = \dfrac{-1}{(2x-1)^{3/2}}$

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

$y' = \dfrac{10}{21}x^{-1/3}$

OR $y' = \dfrac{10}{21x^{1/3}}$

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

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

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

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

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

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

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

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

10) $y(x) = \dfrac{(2)^{3x}}{(6 - 2x)^3}$

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

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

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

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

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

10) $y(x) = \dfrac{(2)^{3x}}{(6-2x)^3}$

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

$y'(x) = \dfrac{(3)(2^{3x})(6-2x)^2\left[(\ln 2)(6-2x) + 2\right]}{(6-2x)^{\cancel{6}\,4}}$

$y'(x) = \dfrac{(3)(2^{3x})\left[(\ln 2)(6-2x) + 2\right]}{(6-2x)^4}$

Find the derivative of each function. <u>**Do NOT simplify answers**</u>.

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

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

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

Find the derivative of each function. <u>Do NOT simplify answers</u>.

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

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

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

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

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

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

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

14) $f(x) = \overbrace{\cos(3x)}^{a} \cdot \overbrace{(4x-1)^6}^{b} \cdot \overbrace{(2^x)}^{c}$

$f'(x) = \underbrace{-\sin(3x)(3)}_{a'} \underbrace{(4x-1)^6}_{b} \underbrace{(2^x)}_{c} +$

$\underbrace{\cos(3x)}_{a} \cdot \underbrace{6(4x-1)^5(4)}_{b'} \cdot \underbrace{(2^x)}_{c} +$

$\underbrace{\cos(3x)}_{a} \underbrace{(4x-1)^6}_{b} \underbrace{(\ln 2)2^x}_{c'}$