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Derivatives Quiz

~~25~~ 24/25

Differentiate the following – Do Not Simplify unless indicated

1. $y = 3x^2 - 8x$

$y' = 6x - 8$ ✓

2. $y = 4x^{-2} - 8x + 1$

$y' = -8x^{-3} - 8$ ✓

3. $y = \frac{1}{4x^4} - \frac{1}{3x^3} + \frac{1}{2x^2} - \frac{1}{x} + 3$

$y' = -16x^3 + 9x^2 - 4x + x^{-2}$ ✗

$y' = -x^{-5} + x^{-4} - x^{-3} + x^{-2}$

4. $y = 5\sqrt[3]{x^4} - \frac{3}{4x^3} + 2x^3 - 3$

$y = 5x^{\frac{4}{3}} - 3(4x)^{-3} + 2x^3 - 3$

$y' = \frac{20}{3}x^{\frac{1}{3}} + 9(4x)^{-4}(4) + 6x^2$ ✓

5. $y = \frac{-8x^{14} + 53x^8 - 12x^2 - 5x + 7}{x^7} = (-8x^{14} + 53x^8 - 12x^2 - 5x + 7)(x^{-7})$

$y' = (-8x^{14} + 53x^8 - 12x^2 - 5x + 7)(-7x^{-6}) + (-112x^{13} + 424x^7 - 24x - 5)(x^{-7})$ ✓

6. $y = (7x^2 - 1)^5$

$y' = 5(7x^2 - 1)^4(14x)$ ✓

7. $y = (3x^2 - 1)(x^2 - 2x + 2)$

$y' = (3x^2 - 1)(2x - 2) + (x^2 - 2x + 2)(6x)$ ✓

8. $y = \frac{5x^3}{\sqrt{3x^2 - 4}} = \frac{5x^3}{(3x^2 - 4)^{\frac{1}{2}}}$

$y' = \frac{(3x^2 - 4)^{\frac{1}{2}}(15x^2) - (5x^3)(\frac{1}{2})(3x^2 - 4)^{\frac{-1}{2}}(6x)}{3x^2 - 4}$ ✓

9. $f(x) = (3x^3 + 4)(1 - 2x^3)$

$f'(x) = (3x^3 + 4)(-6x^2) + (1 - 2x^3)(9x^2)$ ✓

10. $f(x)=(x^3-7)(x-2)^3$ (Simplify)

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

$= 3(x-2)^2[(x^3-7) + (x-2)(x^2)]$

$= 3(x-2)^2(x^3-7+x^3-2x^2)$

$= 3(x-2)^2(2x^3-2x^2-7)$ ✓

11. $f(x)=\dfrac{3x^2-2}{x+7}$ (Simplify) $(3x^2-2)(x+7)^{-1}$

$f'(x) = (3x^2-2)(-1)(x+7)^{-2}(1) + (x+7)^{-1}(6x)$

$= (x+7)^{-2}[(3x^2-2)(-1) + (x+7)(6x)]$

$= (x+7)^{-2}[-3x^2+2+6x^2+42x]$

$= (x+7)^{-2}(3x^2+42x+2)$ ✓

12. $y^3=3x^6-2x^8+5$

$3y^2y' = 18x^5-16x^7$

$y' = \dfrac{18x^5-16x^7}{3y^2}$ ✓

13. $y^5+5x^2y^3=x^4-2x^2$

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

$5y^4y' + 5x^2(3y^2y') = 4x^3-4x-10xy^3$

$y' = \dfrac{4x^3-4x-10xy^3}{5y^4+5x^2(3y^2)}$ ✓