



Derivative Skills Practice

Find the Derivative Using the Power Rule:

1. $f(x) = 3x^2 + 4x - 10$
2. $y = \frac{1}{x}$
3. $g(x) = \frac{3}{2x^5}$
4. $h(x) = \sqrt[3]{x}$
5. $y = \frac{1}{\sqrt{x}}$
6. $f(x) = 1 + x^{-1} + x^{-2} + x^{-3}$

Find the Derivative Using the Chain Rule:

1. $k(x) = 3(x + 4)^2$
2. $y = 2(x^3 + 4x)^3$
3. $p(x) = \sqrt{x - 16x^2}$
4. $y = (x^2 - 6x + 5)^4$
5. $f(x) = \sqrt[4]{7 + 4x - 2x^2}$
6. $t(x) = 17(x^4 + 8x^2 - 10)^2$

Find the Derivative Using the Product Rule:

1. $f(x) = x^2e^x$
2. $y = (x^4 + 2x^2)(3x^2 + 7x - 5)$
3. $h(x) = \sin(x) \cos(x)$
4. $g(x) = (x^2 - x - 2)(x^2 + 2x - 8)$
5. $p(x) = (4x^3 + 2x - 5)(8 - 9x^3)$
6. $y = (x^2 + 1)(x^2 + 2)(x^3 + 3)$

Find the Derivative Using the Quotient Rule:

1. $f(x) = \frac{x^2}{x+4}$
2. $g(x) = \frac{3x^2+4x}{e^x}$
3. $h(x) = \frac{3x-1}{x^2}$
4. $y = \frac{(11x^2-10x+1)^{3/2}}{(3x^2+5x+7)^{4/3}}$
5. $p(w) = \frac{2w+5}{7w-9}$
6. $f(v) = \frac{v^3-1}{v^2+1}$

Find the Derivative Using the Special Rules:

1. $f(x) = \sin(3x^2)$
2. $y = \ln(3x)$
3. $g(x) = \cos(x^2 + 10)$
4. $h(x) = e^{4x}$
5. $p(x) = \tan(2x^2 - 5x + 1)$
6. $y = 2^x$

Answer Key

Power Rule Solutions

1. $f'(x) = 6x + 4$

2. $\frac{dy}{dx} = -\frac{1}{x^2}$

3. $g'(x) = -\frac{15}{2x^6}$

4. $h'(x) = \frac{1}{3\sqrt[3]{x^2}}$

5. $\frac{dy}{dx} = -\frac{1}{2x\sqrt{x}}$

6. $f'(x) = -\frac{1}{x^2} - \frac{2}{x^3} - \frac{3}{x^4}$

Chain Rule Solutions

1. $k'(x) = 6(x + 4)$

2. $\frac{dy}{dx} = 6(x^3 + 4x)^2(3x^2 + 4)$

3. $p'(x) = \frac{1-32x}{2\sqrt{x-16x^2}}$

4. $\frac{dy}{dx} = 4(x^2 - 6x + 5)^3(2x - 6)$

5. $f'(x) = \frac{1-x}{\sqrt[4]{(7+4x-2x^2)^3}}$

6. $t'(x) = 34(x^4 + 8x^2 - 10)(4x^3 + 16x)$

Product Rule Solutions

1. $f'(x) = x^2e^x + 2xe^x$

2. $\frac{dy}{dx} = (x^4 + 2x^2)(6x + 7) + (3x^2 + 7x - 5)(4x^3 + 4x)$

3. $h'(x) = \cos^2x - \sin^2x$

4. $g'(x) = (x^2 - x - 2)(2x + 2) + (x^2 + 2x - 8)(2x - 1)$

5. $p'(x) = -27x^2(4x^3 + 2x - 5) + (8 - 9x^3)(12x^2 + 2)$

6. $\frac{dy}{dx} = (x^2 + 1)[3x^2(x^2 + 2) + 2x(x^3 + 3)] + 2x(x^2 + 2)(x^3 + 3)$

Quotient Rule Solutions

1. $f'(x) = \frac{x^2+8x}{(x+4)^2}$

2. $g'(x) = \frac{-3x^2+2x+4}{e^x}$

3. $h'(x) = \frac{-3x+2}{x^3}$

4. $\frac{dy}{dx} = \frac{(3x^2+5x+7)^{4/3}(3/2)(11x^2-10x+1)^{1/2}(22x-10) - (11x^2-10x+1)^{3/2}(4/3)(3x^2+5x+7)^{1/3}(6x+5)}{(3x^2+5x+7)^{8/3}}$

5. $p'(w) = \frac{-53}{(7w-9)^2}$

6. $f'(v) = \frac{v^4+3v^2+2v}{(v^2+1)^2}$

Special Rules Solutions

1. $f'(x) = 6x\cos(3x^2)$

2. $\frac{dy}{dx} = \frac{1}{x}$

3. $g'(x) = -2x\sin(x^2 + 10)$

4. $h'(x) = 4e^{4x}$

5. $p'(x) = (4x - 5)\sec^2(2x^2 - 5x + 1)$

6. $\frac{dy}{dx} = 2^x \ln(2)$