

Sum, difference, constant-multiple rules

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Practice problems

1. Find the derivative of $f(x) = 7x^4 - 2x^3 + 5x - 12$.
2. Find the derivative of $g(x) = \frac{1}{4}x^4 + \frac{2}{3}x^3 - 8$.
3. Find the derivative of $h(x) = (2x + 1)(x - 5)$.

Solutions

1. Find the derivative of $f(x) = 7x^4 - 2x^3 + 5x - 12$.

- Apply the power rule to $7x^4$ to get $7(4x^3) = 28x^3$.
- Apply the power rule to $-2x^3$ to get $-2(3x^2) = -6x^2$.
- Apply the power rule to $5x$ to get $5(1) = 5$.
- The derivative of the constant -12 is 0.

Answer: $f'(x) = 28x^3 - 6x^2 + 5$

2. Find the derivative of $g(x) = \frac{1}{4}x^4 + \frac{2}{3}x^3 - 8$.

- Differentiate $\frac{1}{4}x^4$ as $\frac{1}{4}(4x^3) = x^3$.
- Differentiate $\frac{2}{3}x^3$ as $\frac{2}{3}(3x^2) = 2x^2$.
- The derivative of -8 is 0.

Answer: $g'(x) = x^3 + 2x^2$

3. Find the derivative of $h(x) = (2x + 1)(x - 5)$.

- First, expand the expression: $h(x) = 2x^2 - 10x + x - 5 = 2x^2 - 9x - 5$.
- Differentiate $2x^2$ to get $4x$.
- Differentiate $-9x$ to get -9 .
- The derivative of -5 is 0.

Answer: $h'(x) = 4x - 9$