
Derivatives of Polynomials and Exponential Functions

Solutions should show all of your work, not just a single final answer.

1. Compute the derivative of the functions below using differentiation rules.

(a) $f(x) = 7x^3 - 5x + 8$

(b) $f(x) = e^x + x^e$

(c) $f(x) = \sqrt{2x} + \sqrt{3x}$

(d) $f(x) = \sqrt[4]{x} - 4e^x$

(e) $f(x) = \frac{x^2 + 4x + 3}{\sqrt{x}}$

(f) $f(x) = \frac{12}{x^5} - \frac{7}{\sqrt[5]{x}}$

2. Find equation of the tangent line to the curve $y = x^2 - x^4$ at $(1, 0)$.

3. Let

$$f(x) = \begin{cases} x^2 & \text{if } x \leq 2 \\ mx + b & \text{if } x > 2 \end{cases}$$

Find the values of m and b that make f differentiable.

4. Find the points on the curve $f(x) = \frac{1}{3}x^3 - x^2$ where the tangent line is parallel to the line $y = 3x$.
5. T/F (with justification) If $f(x) = \sqrt{7}$ for all x , then $f'(x) = \frac{1}{2\sqrt{7}}$ for all x .