

Derivatives of Inverse Functions

Directions: Show your work neatly on a separate sheet of paper.

A. Find the derivative of f^{-1} for each of the following functions:

1. $f(x) = 5x^3 + x - 7$

2. $f(x) = 2x^5 + x^3 + 1$

3. $f(x) = 5x - \sin(2x)$

B. Evaluating the Derivatives of Inverse Functions

1. Find the derivative of the inverse of $f(x) = x^3 + 7x + 2$ at the point where $f^{-1}(10) = 1$.

2. Let f be the function defined by $f(x) = x^3 + x$. If $g(x) = f^{-1}(x)$ and $g(2) = 1$, what is the value of $g'(2)$?

3. Let f be the function defined by $f(x) = x^3 + 8x + \cos(3x)$. If $g(x) = f^{-1}(x)$ and $g(1) = 0$, find the value of $g'(1)$.

4. If $f(x) = x^5 + 3x + 2$ and $g(x) = f^{-1}(x)$, find $(g^{-1})(2)$.

5. Find $(f^{-1})'(2)$ if $f(2) = 6$, $f(-1) = 2$, $f'(2) = 1$, and $f'(-1) = \frac{1}{2}$

6. Find $(f^{-1})'(5)$ if $f(x) = x^3 + 2x + 5$.