

Homework Set 8

Inverse Functions

(sect 3.2, 3.3, 3.5)

For questions 1 and 2, find the inverse of the given function.

1. $f(x) = 1 + \sqrt{2 + 3x}$

2. $y = \frac{e^x}{1+2e^x}$

3. Suppose f^{-1} is the inverse function of a differentiable function f and $f(4) = 5$, $f'(4) = \frac{2}{3}$. Find $(f^{-1})'(5)$.

4. Let $f(x) = 2x^3 + 3x^2 + 7x + 4$. Compute $(f^{-1})'(4)$.

5. Let $f(x) = x^3 + 3 \sin x + 2 \cos x$. Compute $(f^{-1})'(2)$.

6. $f(x) = 9 - x^2$ where $0 \leq x \leq 3$
- Use the rule for the derivative of an inverse function to find $(f^{-1})'(8)$.
 - Calculate $f^{-1}(x)$.
 - Compute $(f^{-1})'(8)$ from the inverse function found in part (b).
7. $f(x) = \frac{1}{x-1}$ where $x > 1$
- Use the rule for the derivative of an inverse function to find $(f^{-1})'(2)$.
 - Calculate $f^{-1}(x)$.
 - Compute $(f^{-1})'(2)$ from the inverse function found in part (b).

Use trig identities, implicit differentiation, and inverse functions to show the following derivative rule.

8. $\frac{d}{dx}(\operatorname{arcsec} x) = \frac{1}{x\sqrt{x^2-1}}$