

Derivatives of Inverses, Logs, and Exponentials

Find the derivative of each.

1. $y = \cos^{-1} x^2$

6. Let $f(x) = \cos x + 3x$

a. Find $f(0)$ and $f'(0)$.

b. Find $f^{-1}(1)$ and $(f^{-1})'(1)$.

2. $y = \cos^{-1} \frac{1}{x}$

7. 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. $y = \sin^{-1} \sqrt{2}t$

Find the derivative of each.

8. $y = 2e^x$

4. $y = \sin^{-1}(1 - t)$

9. $y = e^{-x}$

Answer each question.

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

a. Find $f(1)$ and $f'(1)$.

b. Find $f^{-1}(3)$ and $(f^{-1})'(3)$.

10. $y = e^{\frac{2x}{3}}$

$$11. y = xe^{2x} - x^2e^x$$

$$16. y = \ln\left(\frac{2}{x}\right)$$

$$12. y = e^{x^2}$$

$$17. y = \ln\left(\frac{1}{(3x-1)^2}\right)$$

$$13. y = xe^{\sqrt{x}}$$

$$18. y = \ln(x\sqrt{2x+1})$$

$$14. y = \ln(x^2)$$

$$19. y = x \ln 4x - x$$

$$15. y = (\ln x)^2$$

$$20. \text{ Find } f'(0) \text{ when } f(x) = \ln(x + 4 + e^{-3x}).$$