

Name: \_\_\_\_\_

AP Calculus: Derivatives of Inverses, Inverse Trig Functions, Exponential Functions, and Logarithmic Functions

Directions: Show all steps leading to your answers, including any intermediate results obtained using a graphing utility. Use the back of the test or another sheet of paper if necessary.

List the derivatives for the following trig functions.

Original Function	Derivative
1. $y = \sin^{-1}x$	
2. $y = \cos^{-1}x$	
3. $y = \tan^{-1}x$	
4. $y = \cot^{-1}x$	
5. $y = \sec^{-1}x$	
6. $y = \csc^{-1}x$	
7. $y = e^x$	
8. $y = a^x$	
9. $y = \ln x$	
10. $y = \log_a x$	

For Questions 11 – 14, find  $\frac{dy}{dx}$ .

11. $y = \cos^{-1}(3x)$	12. $y = \cot^{-1}(x^2)$
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$$13. y = \sin^{-1}\left(\frac{4}{x}\right)$$

$$14. y = \sec^{-1} \sqrt{x}$$

$$15. y = e^{\cos x}$$

$$16. y = \ln(x^3)$$

$$17. y = 3^{2x^5+4x}$$

$$18. y = e^x \log_5(2x+7)$$

19. Use implicit differentiation to find  $dy/dx$ :

$$2x - 3y + \ln(xy) = 4$$

20. If  $y = F(x)$  is a one-to-one function and the point  $(a,b)$  is on the graph of  $y = F(x)$ . If  $\left. \frac{dF}{dx} \right|_a = 7$ ,

find  $\left. \frac{dF^{-1}}{dx} \right|_b$ .

21. Find the tangent line to  $y = \tan^{-1}(2x)$  at  $x = \frac{1}{2}$ .