

J. LAMB**MATH 1910 CH.3 TEST**

NAME:

DATE:

PLEASE SHOW ALL WORK AND ANSWERS ON SEPARATE PAPER. THANKS.

1. Prove $\frac{d}{dx} \cot x = -\csc^2 x$

2. Prove $\frac{d}{dx} \sec x = \sec x \tan x$

3. Prove $\frac{d}{dx} \cos^{-1} x = \frac{-1}{\sqrt{1-x^2}}$

4. Prove $\frac{d}{dx} \log_a x = \frac{1}{x \ln a}$

5. $y = x^{\frac{10}{3}} - 3.2x^2 + 2x$ find $y', y'', y''', y^{(4)}$

6. A rock blasted vertically upward with a velocity of 300 ft/sec reaches a height of $s = 300t - 16t^2$ ft. after t sec.

a. How high does the rock go?

b. How fast is the rock traveling when it is 400 ft. above the ground on the way up? On the way down?

For problems 7-12 please find the derivative as indicated.

7. $y = (x^2 - 6x + 8)^4$

8. $y = (2x^2 + 5)^2 (7x - 8)^3$ simplify to 1 term by factoring

9. $y = \frac{2x^2 - 3}{3x^2 + 2}$ use quotient rule

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

11. $5y^4 + 3xy^3 - 2x^5 = 17$

12. Find $\frac{d^2 y}{dx^2}$ if $5x^3 - 3y^2 = 7x$

13. Find the tangent line to the curve $y^2 - 8x^2 + 6y + 7 = 0$ at the point $(-3, 4)$.**For problems 14-25 please find the derivative as indicated.**

14. $y = \sqrt[4]{(7x^2 - x + 4)^5}$

15. $y = \sin^3(5x)$

16. $y = \csc \sqrt[3]{4x - 5}$

17. $f(t) = \tan^{-1} \sqrt{5 - 2t}$

18. $f(x) = \sin^{-1} \sqrt{2x - 1}$

19. $g(x) = \sqrt{\tan^{-1}(5x)}$

20. $f(x) = (\ln 2x)^4$

21. $f(x) = \sqrt{3x} \ln(3x)$ simplify to one term

22. $f(x) = \ln\left(\frac{\sec x}{x^3 + 2}\right)$

23. $y = \ln \sqrt[5]{\left(\frac{5x - 4}{x^2 + 3x}\right)^2}$

24. $y = (\ln(4 \cos x))^3$

25. $y = \frac{(7x - 4)(4x^3 - 9)^3 (x^2 - 5)^2}{(x^2 - 4)^{\frac{1}{3}}}$

BONUS: (4 points of easy fun...really!) Find $\frac{dy}{dx}$ if $y = \log_4 \left(\sin \left(x^{\frac{2}{3}} + x^{\frac{1}{5}} - \sqrt{7} \right) \right)^{3x}$