

Advanced Placement Calculus

Name _____

Copy original problem.

Per _____

Date _____

Convince *me* that **you** understand the concept!**No Calculators, please.**

Chapter 5 Exam

I Let f be the function defined by $f(x) = -2 + \ln x^2$. (total 25 pts)

- For what real numbers is f defined?
- Find the zeros of f .
- Write an equation for the line tangent to the graph of f at $x = 1$.

II Given $f(x) = \sin^3 x + \sin^3 |x|$ (tot 25 pts)

- Rewrite f as a piecewise function.
- Prove f is continuous for all x .
- Using the definition of the derivative, find $f'(0)$.

III Given f is a one-to-one continuous function with the values in the table: (10 pts tot)

x	$f(x)$	$f'(x)$
1	2	4
2	1	6

- Determine the value of the derivative of $f^{-1}(x)$ evaluated at $x = 2$.
- Determine the value of $f^{-1}(f^{-1}(1))$.

IV Find $\tan(\sin^{-1}(\frac{2}{3}) + \csc^{-1} 3)$ (Do not rationalize.) (10 pts)**V** Given y , find $\frac{dy}{dx}$ evaluated at the indicated point. (10 pts ea)

a) $y = (\tan^{-1} x)^{\cos x}$ Find $\frac{dy}{dx}\bigg|_{x = \frac{\pi}{4}}$

b) $y = x^{x^x}$ Find $\frac{dy}{dx}\bigg|_{x = 2}$

c) $y = e^x + x^e$ Find $\frac{dy}{dx}\bigg|_{x = \ln 2}$

Extra Credit ----- 5 pts -----

“A number has the property that its reciprocal is one less than the number.”

Is this possible? If so, how many numbers satisfy the quote. If not, explain how you know that.