Advanced Placement Calculus

Name _____

Copy original problem.   Per _____   Date _____

Convince *me* that **you** understand the concept*!*

Chapter 5 Exam

I   Given $f(x)$, find $f'(x)$. Simplify answers.   (10 pts ea)

a) $f(x) = -\dfrac{1}{3}\sin^{-1}\left(\dfrac{3}{x}\right)$ b) $f(x) = \ln\left[\ln\left(1 + x^2\right)\right]$ c) $f(x) = \left(2^{3x}\right)\left(5^{7x}\right)$

d) $f(x) = 3^{\frac{1}{3}\sin 3x}$ e) $f(x) = \dfrac{x}{2}\sqrt{2 - x^2} + \sin^{-1}\left(\dfrac{x}{\sqrt{2}}\right)$

II   Given $y = 3^x$. Find the x-intercept of the tangent to the curve y at $x = 2$.   (15 pts)
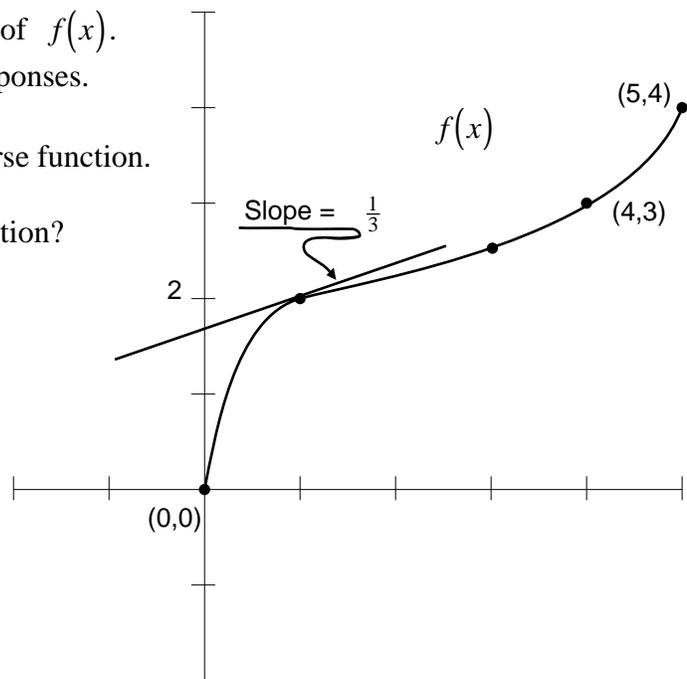
III   Prove that $y' = \sin^4 5x$, given : $y = \dfrac{3x}{8} - \dfrac{3\sin 10x}{80} - \dfrac{\sin^3 5x \cos 5x}{20}$ (10 pts)

IV   Show that $\sec^{-1} x = \cos^{-1}\left(\dfrac{1}{x}\right)$. Be sure to include **all** restrictions on *any* variables.   (10 pts)

V   Given the information shown on the graph of $f(x)$.   (5 pts ea)
        Be sure you explain and/or justify your responses.

a) How you know that $f(x)$ has an inverse function.

b) What is the domain of this inverse function?

c) Find $f^{-1}\left(f^{-1}(3)\right)$.

Extra Credit ------------------------------------ **5 pts** ---
        Find the derivative of $f^{-1}(x)$ as defined in section V evaluated at $x = 2$. Explain.