

**Beverly Hills High School -- AP Calculus BC -- Chapter 3 Part 2 -- 40 points**

Be clear and organized in all of your answers. State conclusions if necessary. Show all of your work. Pencils only, please. All problems are four points except for the last one.

Find the first derivative as appropriate for each of the following:

1)  $y = 4 \tan 9x^2$

2)  $f(x) = \frac{\csc 3x}{4 - x}$

3)  $\Lambda(\eta) = (\eta + \sqrt{5\eta})^{-3}(\eta - 1)$

4)  $y = 7^x - \pi^{x^2}$

5) Derive an expression for the derivative of the inverse tangent function.

6) Show, using the expansion of  $e^x$ , that it is its own derivative.

7) Find the equation for the normal line to the curve  $5xy - x^2y - 2xy^2 = -12$  at the point (3,2).

Choose #8 or #9 -- Cross out the one you do not want graded. Eight points on this one.

8) Find  $dy/dx$  for  $y = x^{\sin x/x}$

9) Find  $\frac{d^2y}{dx^2}$  for  $x^{2/3} + y^{2/3} = 1$  in terms of  $x$  only.

**EXTRA CREDIT** - All or Nothing - Five points. (If no one gets it, then first right answer turned in to me with the written solution gets the points - one week time limit.)

10) Find all three positive solutions for  $x$  which satisfy

$$(2 + \log_{10} x)^3 + (-1 + \log_{10} x)^3 = (1 + \log_{10} x^2)^3$$