# Advanced Placement Calculus

Name _____

Copy original problem. Per _____ Date _____

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

## Chapter 5 Exam

**I** Evaluate the following. No decimals. (12 pts ea)

a) $y = \tan^{-1}\sqrt{1 + x^2}$
Find $y'(1)$

b) $y = (x + 1)^{(x+1)}$
Find $y'(1)$

c) $y = (\ln x)^x$
Find $y'(e^2)$

d) $y = \left(\frac{2x}{1 - x} + \frac{2}{x - 1}\right)^e$
Find $y'(2)$

e) $y = \ln\left[\frac{\sqrt{2x + 1}\,\sqrt[3]{3x + 2}}{\left(x^2 + 1\right)^5}\right]$
Find $y'(1)$

**II** Derivatives of the inverse trig functions. (tot 40 pts)

a) Prove: $\sin\left(\cos^{-1} x\right) = \sqrt{1 - x^2}$

b) Prove: $\frac{d\left(\cos^{-1} x\right)}{dx} = \frac{-1}{\sqrt{1 - x^2}}$

c) Compute $\texttt{nDeriv}\left(\sin\left(2\cos^{-1} x\right), x, .5\right)$ where "nDeriv(" is under the "math" menu.

d) Given: $f(x) = \sin\left(2\cos^{-1} x\right)$

1) First simplify the function using the "sine add" formula then find the derivative of the result. Evaluate your derivative at $x = .5$.

2) Using the chain rule, find the derivative of $f(x)$ as it stands.
Evaluate your derivative at $x = .5$.

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

Given: $p(x)$ is a non-zero odd function; $q(x)$ is a non-zero even function

Which of these must be odd: *I*. $q(p(x))$ *II*. $p(q(x))$ *III*. $p(x)q(x)$.

A) *I* B) *II* C) *III* D) *I* and *II* E) none of these