

Advanced Placement Calculus

Name _____

Copy original problem.

Per _____

Date _____

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

Chapter 5 Exam

IOf the twelve offered problems, you are required to do exactly 10. Given y , find $\frac{dy}{dx}$

Your final answers should be fully factored.

(60 pts tot)

a) $(2x^3 - 1)e^{3x}$

b) $\left(\frac{x + e^x}{e^x}\right)^3$

c) $\ln(\ln x)^2$

d) $x^{\ln x}$

e) $\ln 3^x$

f) $\ln \frac{xe^x}{\sqrt{1+x}}$

g) $\ln \sqrt[3]{\cos x}$

h) x^x

i) 10^{x^2}

j) $\ln x^{\ln x}$

k) $3\sec^{-1}\left(\frac{3}{x}\right)$

l) $\cos(\sin^{-1} x)$

IIFind the equation of the tangent line to the curve: $y = (x^2 - 15)^6$ at $x = 4$.

(15 pts)

IIIGiven: $f(x) = \frac{1}{2} \left[x\sqrt{x^2 + a^2} + a^2 \ln(x + \sqrt{x^2 + a^2}) \right]$, show that $f'(x) = \sqrt{x^2 + a^2}$

(10 pts)

IVUse the result of the chain rule on $f^{-1}(f(x)) = x$,

(15 pts tot)

That is use: $(f^{-1})'(f(x)) = \frac{1}{f'(x)}$

to develop the derivative of $f(x) = \tan^{-1} x$.

Include the definitions of whatever variables which are needed in any proofs.

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

Identify the two problems from section I which you didn't do as part of the required 10 and do them now for a total of 5 points.