Name: _____ AP Calc AB Problem Set #4

Find the derivative of each of the following using logarithmic differentiation. Show your work!!

1. $y = (\cos x)^{\sqrt{x}}$

2. $y = \dfrac{\sqrt[3]{x^2 - 2}}{(x^3 - 4x)^4 (x^4 + 3x^3)}$

3. $y = (x^2 + 3x + 2)^{\sin x}$

Find the derivative of each of the following. Show your steps!!

4. $y = \ln(\cos x)$

5. $f(x) = \sin^6[\cos(\ln x)]$

6. $y = e^{\sin^{-1} 6x}$

Let f and g be differentiable functions with values for f, g, f', and g' at $x = 1$ and $x = 2$ be given in the table below:

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
1	4	2	10	-6
2	$\sqrt{5}$	5	-3	12

Determine the value of each of the following, showing all work:

7. $k'(2)$ if $k(x) = f(x) + g(x)$

8. $j'(1)$ if $j(x) = f(x)g(x)$

9. $m'(1)$ if $m(x) = f(g(x))$

10. Find the equation of the tangent line of $y = \ln\left(x^4\right)$ at $x = 3$. Show all work!!

11. Find the equation of the tangent line of $y = e^{5x}$ at $x = -2$. Show all work!!

12. Use implicit differentiation to find $\frac{dy}{dx}$ for $x^2y + y^2x - 3 = 0$. Show all work!!