

NAME _____

1. Suppose that f is differentiable and that there are points a and b such that $f(a) = b$ and $f(b) = a$. Let $k(x) = f(f(f(f(x))))$. Show that $k'(a) = k'(b)$.
2. Find the derivative of the following
 - (a) $y = 2 \tan^2 2x^2$
 - (b) $y = \tan(\sec x)$
 - (c) $y = \sqrt{\csc \sqrt{1 + x^2}}$
3. Find the equation of the tangent line to $y = \tan^2 x$ when $x = \pi/3$.
4. For $f(x) = \sec^2 x$ and $g(x) = \tan^2 x$, show that $f'(x) = g'(x)$.
5. Suppose that $f(0) = 0$ and $f'(0) = 2$. Calculate the derivative of $f(f(f(x)))$ when $x = 0$.
6. Find y' by implicit differentiation if

$$\frac{1}{x} + \frac{1}{y} = xy.$$

7. What is y' if $\cos xy = x^3 + \tan \sqrt{x^2 + y^2}$?
8. What is y'' if $x^2 + 3xy + 4y^2 + 2x - 7y + 1 = 0$?
9. If $p(x) = (1 + x^9)^{11}$, compute the one hundredth derivative $p^{(100)}(x)$.
10. Suppose that $y'(x) = \cos^2 x$, and that $y(0) = 0$. Find $y(x)$. Hint: Use the double angle formula.
11. Consider the 'flat circle' $x^4 + y^4 = 1$. At which point(s) is the slope of the tangent line equal to -1 ?