

Math 2215 - Calculus 1

Homework #3 - 2005.09.13

Due Date - 2005.09.19

1. Prove that if $f(x)$ is even, then $f'(x)$ is odd.
2. Find the points on the curve $y = ax^3 + bx^2 + cx + d$ where the tangent is horizontal. Here, assume that $a \neq 0$.
3. From your answer in problem 2, what guarantees that the function y has at least one point at which the tangent line is horizontal.
4. What would it mean about the shape of the graph of y if there was only ONE point at which there was a horizontal tangent line.
5. Use the product rule to find $\frac{d}{dx} [f(x) \cdot g(x) \cdot h(x) \cdot i(x)]$.
6. Use the product rule to show that $\frac{d}{dx} [g(x)^n] = n (g(x)^{n-1}) g'(x)$.
7. If $f(2) = 3$, $g(2) = 1$, $f'(2) = 2$ and $g'(2) = 4$, find the following values.
 - a) $\left(\frac{f}{g}\right)'(2)$
 - b) $\left(\frac{f+g}{f-g}\right)'(2)$
 - c) $[(f+2g)(f-3g)]'(2)$
8. Compute the derivatives of the following functions.
 - a) $p(x) = a_0 + a_1x + a_2x^2 + a_3x^3 + \dots + a_nx^n$
 - b) $t(u) = \frac{\sin(u)}{u^2 + \cos(u)}$
 - c) $g(r) = r^2e^r (\cos(r) + \sin(r))$
9. Evaluate the following limit: $\lim_{x \rightarrow 1} \frac{x^{1252352} - 1}{x - 1}$