

Worksheet 0

1/9/2023

For Problems 1-8, determine whether the statement is true or false. If it is true, explain why. If it is false, explain why or give an example that disproves the statement, and suggest a way to fix the statement.

1. If f and g are differentiable then $\frac{d}{dx}[f(x) + g(x)] = f'(x) + g'(x)$.
2. If f and g are differentiable then $\frac{d}{dx}[f(x)g(x)] = f'(x)g'(x)$.
3. If f and g are differentiable then $\frac{d}{dx}\sqrt{f(x)} = \sqrt{f'(x)}$.
4. If f and g are differentiable then $\frac{d}{dx}f(\sqrt{x}) = f'\left(\frac{1}{2\sqrt{x}}\right)$.
5. If $f'(c) = 0$ then f has a local maximum or minimum at c .
6. If f has an absolute minimum value at c , then $f'(c) = 0$.
7. If f is differentiable and $f(-1) = f(1)$ then there is a number c such that $|c| < 1$ and $f'(c) = 0$.
8. If f is an increasing function on an interval (a, b) then $g(x) = \frac{1}{f(x)}$ is a decreasing function on (a, b) .

Do also the following problems:

9. Find the linearization $f(x) = \sqrt[3]{1+3x}$ of at $a = 0$. State the corresponding linear approximation and use it to give an approximate value for $\sqrt[3]{1.03}$.
10. Find dy if $y = x^3 + x^2 + x + 1$, $x = 2$, and $dx = 0.02$.