DERIVATIVES II (ATTENDANCE QUIZ)

COLTON GRAINGER (MATH 1300)

Print your **full name** and **three digit section number** in the top right corner. You are free to discuss these questions with others while making your attempt. Questions from [1] and [2].

1. If $f(x)$ is a differentiable function, then $f(x)$ is a continuous function.
   - TRUE
   - FALSE
2. If g is differentiable at $x = a$ and f is differentiable at $x = g(a)$, then $f \circ g$ is differentiable at $x = a$.
   - TRUE
   - FALSE
3. If $f''(c) = 0$, then $f(x)$ has an inflection point at $x = c$.
   - TRUE
   - FALSE
4. True or false: The following function is differentiable at $x = 0$,

$$f(x) := \begin{cases} x+1, & x \leq 0 \\ 1 - x^2, & x > 0. \end{cases}$$

   - TRUE
   - FALSE
5. Suppose f is a function defined on a closed interval $[a, c]$. Suppose that the left-hand derivative of f at c exists and equals ℓ. Which of the following implications is **true in general**?

   (A) If $f(x) < f(c)$ for all $a \leq x < c$, then $\ell < 0$.
   (B) If $f(x) \leq f(c)$ for all $a \leq x < c$, then $\ell \leq 0$.
   (C) If $f(x) < f(c)$ for all $a \leq x < c$, then $\ell > 0$.
   (D) If $f(x) \leq f(c)$ for all $a \leq x < c$, then $\ell \geq 0$.
   (E) None of the above is true in general.
6. Suppose f and g are increasing functions from $\mathbf{R}$ to $\mathbf{R}$. Which of the following functions is *not* guaranteed to be an increasing function from $\mathbf{R}$ to $\mathbf{R}$?

   (A) $f + g$
   (B) $f \cdot g$
   (C) $f \circ g$
   (D) All of the above, i.e., none of them is guaranteed to be increasing.
   (E) None of the above, i.e., they are all guaranteed to be increasing.

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Repo: `https://github.com/coltongrainger/pro19ta`.

References

[1] V. Naik, “Math 152 Course Notes” [Online]. Available: https://vipulnaik.com/math-152/

[2] L. Roberson, “Math 1300 Exam Materials,” CU Boulder, Oct-2018 [Online]. Available: https://math.colorado.edu/math1300/1300exams.html