

CLASS QUIZ: OCTOBER 10: DERIVATIVES

MATH 152, SECTION 55 (VIPUL NAIK)

Your name (print clearly in capital letters): _____

Write your answer in the space provided. In the space below, you can explain your work if you want (this will not affect scoring). I may or may not get time to look at the work you have done, but it may help you recall how you arrived at a particular answer.

You are expected to take about one minute per question.

- (1) Consider the expression $x^2 + t^2 + xt$. What is the derivative of this with respect to x (with t assumed to be a constant)? *Last year: 11/12 correct*
- (A) $2x + 2t + x + t$
 - (B) $2x + 2t + 1$
 - (C) $2x + 2t$
 - (D) $2x + t + 1$
 - (E) $2x + t$

Your answer: _____

- (2) Which of the following verbal statements is **not valid as a general rule**? *Last year: 10/12 correct*
- (A) The derivative of the sum of two functions is the sum of the derivatives of the functions.
 - (B) The derivative of the difference of two functions is the difference of the derivatives of the functions.
 - (C) The derivative of a constant times a function is the same constant times the derivative of the function.
 - (D) The derivative of the product of two functions is the product of the derivatives of the functions.
 - (E) None of the above, i.e., they are all valid as general rules.

Your answer: _____

PLEASE TURN OVER FOR THE THIRD AND FOURTH QUESTION.

- (3) (*) Which of the following statements is **definitely true** about the tangent line to the graph of an everywhere differentiable function f on \mathbb{R} at the point $(a, f(a))$ (Here, “everywhere differentiable” means that the derivative of f is defined and finite for all $x \in \mathbb{R}$)? *Last year: 6/12 correct*
- (A) The tangent line intersects the curve at precisely one point, namely $(a, f(a))$.
 - (B) The tangent line intersects the x -axis.
 - (C) The tangent line intersects the $f(x)$ -axis (the y -axis).
 - (D) Any line through $(a, f(a))$ other than the tangent line intersects the graph of f at at least one other point.
 - (E) None of the above need be true.

Your answer: _____

- (4) (*) For a function $f : (0, \infty) \rightarrow (0, \infty)$, denote by $f^{(k)}$ the k^{th} derivative of f . Suppose $f(x) := x^r$ with domain $(0, \infty)$, and r a rational number. What is the **precise set of values** of r satisfying the following: there exist a positive integer k (dependent on r) for which $f^{(k)}$ is identically the zero function. *Last year: 4/12 correct*
- (A) r should be an integer.
 - (B) r should be a nonnegative integer.
 - (C) r should be a positive integer.
 - (D) r should be a nonnegative rational number.
 - (E) r should be a positive rational number.

Your answer: _____