

Solutions

School of Mathematics and Statistics
Carleton University
Math. 1004A, Fall 2013
TEST 2

Any non-programmable calculator permitted, 1 blank sheet permitted for roughs

Print Name :

Student Number:

Tutorial Section (A1, A4, ...):

PART I: Multiple Choice Questions

(Choose and CIRCLE only ONE answer - No part marks here.)

- [2 marks] Given that $ye^{xy} = 1$ and that y may be defined as a differentiable function of x calculate its derivative y' , when $x = 0, y = 1$.
(a) -1, (b) 0, (c) 1, (d) -0.5.
- [2 marks] Calculate the derivative, $f'(0)$, of f where $f(x) = \sin(e^{2x})$ at $x = 0$.
(a) 1, (b) -1, (c) 0, (d) 2. *e) 2 cos 1, none of these!*
- [2 marks] Let f be a differentiable function with $f'(2) = 1/3$ whose inverse, F , satisfies $F(0) = 2$. What is the value of $F'(0)$?
(a) 0, (b) 3, (c) -1, (d) 2.
- [2 marks] Evaluate the following limit using any method: $\lim_{x \rightarrow 0} \frac{\sin x}{e^x - 1}$.
(a) -2, (b) 1, (c) 0, (d) e .
- [2 marks] Evaluate the following limit using any method: $\lim_{x \rightarrow \infty} \frac{2^x - 1}{3^x + 1}$.
(a) $\ln 3$, (b) $\ln 2$, (c) 0, (d) 1.

PART II: Show all work here and give details.

No additional pages will be accepted

6. [5+5 marks] a) Let $f(x) = \text{Arctan}(3x + 4^x)$. Find its derivative $f'(x)$. No need to simplify your answer.

b) Evaluate $\lim_{x \rightarrow 0^+} x \ln x$. (Hint: Use L'Hospital's Rule after you L'Hospitalize it!)

$$a) f'(x) = \frac{1}{1 + (3x + 4^x)^2} (3 + 4^x \ln 4)$$

\uparrow (1) \uparrow (2)

$$b) x \ln x = \frac{\ln x}{(1/x)} \leftarrow (2)$$

$$\lim_{x \rightarrow 0^+} \frac{\ln x}{(1/x)} = \lim_{x \rightarrow 0^+} \frac{1/x}{-1/x^2} \leftarrow (1)$$

$$= \lim_{x \rightarrow 0^+} (-x) \leftarrow (1)$$
$$= 0 \leftarrow (1)$$