University of Bahrain
Department of Mathematics
MATHS101: Calculus I
Fall 2016

Test 2

Student's Name: _____ ID:_____

Section: _____ Serial Number:_____

- *Do not* open the exam until you are instructed to do so.

- Show sufficient work to justify each answer.

- Calculators are allowed but cell phones are *not* allowed during the exam.

- Exchange of any material such as calculator, pen, eraser is *not* allowed.

- **No** questions are allowed.

- You have 1 hour to finish this exam. You can leave only after 30 minutes of the exam.

- There are 2 questions, one consists of 12 multiple choice questions and a total of 5 pages in this exam.

- The multiple choice question should be filled in the bubble sheet and will be graded by the computer.

Question	Points	Score
1	36	
2	14	
Total:	50	

Exam Version: **A**

Question 1 (36 points)

Choose the correct answer **and shade** the answer in the answer sheet for each of the following:

(1) If $y = 5x^2 - \sin x + \csc x$, then $y' =$

    A. $10x + \cos x - \csc x \cot x$ B. $10x - \cos x - \csc x \cot x$ C. $5x - \cos x - \csc x \cot x$

    D. $10x - \cos x - \csc^2 x$ E. $10x - \cos x + \csc x \cot x$ F. $10x - \cos x - \cot^2 x$

(2) $f(x) = (x^9 + 6)e^x$, then $f'(x) =$

    A. $(9x^8)\,e^x$ B. $(9x^8) + (x^9 + 6)e^x$ C. $(9x^8)\,e^x + (x^9 + 6)$

    D. $(x^8)\,e^x + (x^9 + 6)e^x$ E. $(9x^8) + (x^9 + 6)$ F. $(9x^8)\,e^x + (x^9 + 6)e^x$

(3) If $f(x) = \dfrac{3 - x}{1 - x^2}$, then $f'(x) =$

    A. $\dfrac{-x^2 + 6x - 3}{(1 - x^2)^2}$ B. $\dfrac{-x^2 + 6x - 2}{(1 - x^2)^2}$ C. $\dfrac{-x^2 + 6x - 4}{(1 - x^2)^2}$

    D. $\dfrac{3x^2 - 6x - 1}{(1 - x^2)^2}$ E. $\dfrac{-x^2 + 6x - 1}{(1 - x^2)^2}$ F. $\dfrac{-x^2 + 6x - 1}{(1 - x^2)}$

(4) If $y = \sin(-x^6)$, then $y' =$

    A. $\cos(-x^6) \cdot (-6x^5)$ B. $\sin(-x^6) \cdot (-6x^5)$ C. $-6x^5$

    D. $\cos(-x^6)$ E. $\cos(-x^6) \cdot (-6x^6)$ F. $\cos(-x^6) \cdot (6x^5)$

(5) If $y = x^2 + e^{-x} + \sin 6$, then y'

    A. $2x - e^x$ B. $2x + e^{-x} + \cos 6$ C. $2x - e^{-x}$

    D. $2x - e^{-x} + \sin 6$ E. $2x + e^{-x}$ F. $2x - e^{-x} + \cos 6$

(6) If $y = \tan x + 10x$, then $y'' =$

    A. $2\sec^2 x \tan x + 10$ B. $\sec^2 x$ C. $2\sec^2 x \tan^2 x$

    D. $2\sec x \tan x$ E. $2\sec^2 x \tan x$ F. $2\sec x$

(7) At which point on the curve $y = x^2 - 6x + 13$, the slope of the normal line is equal to -0.5?

    A. $(2, 5)$ B. $(5, 8)$ C. $(4, 4)$

    D. $(4, 5)$ E. $(0, 13)$ F. $(4, 2)$

(8) If $y = \log_9(9x + 1)$, then $y' =$

    A. $\dfrac{9}{(9x + 1)(\ln 9)}$ B. $\dfrac{9(\ln 9)}{(9x + 1)}$ C. $\dfrac{3}{(9x + 1)(\ln 9)}$

    D. $\dfrac{1}{(x + 1)(\ln 9)}$ E. $\dfrac{1}{(9x + 1)(\ln 9)}$ F. $\dfrac{9}{(9x + 1)}$

(9) $\displaystyle\lim_{x\to 10^-}\frac{x+10}{|x-10|} =$

    A. 10   B. 0   C. 1

    D. ∞ E. -10 F. $-\infty$

(10) $\displaystyle\lim_{x\to -\infty}\frac{4x^2+5x+2}{-2x^2+x+4} =$

    A. 2   B. 4   C. -2

    D. 0   E. $-\infty$ F. ∞

(11) If $y = \sqrt[x]{2}$, then $y' =$

    A. $\sqrt[x]{2}\,(\ln 2)\left(\dfrac{1}{x^2}\right)$ B. $\sqrt[x]{2}\left(\dfrac{-1}{x^2}\right)$ C. $\sqrt[x]{2}\,(\ln 2)$

    D. $\sqrt[x]{2}\,(\ln 2)\left(\dfrac{-1}{x}\right)$ E. $\dfrac{1}{2\sqrt[x]{2}}$ F. $\sqrt[x]{2}\,(\ln 2)\left(\dfrac{-1}{x^2}\right)$

(12) The slope of the tangent line to the curve $x^3+e = e^y+1$ at $(1,1)$ is

    A. $\dfrac{3e^2}{e}$ B. $\dfrac{e}{3+e}$ C. $\dfrac{3}{e}$

    D. $\dfrac{3+e}{e}$ E. 3   F. $\dfrac{e}{3}$

Question 2 (14 points)

(a) Using the **definition** of the derivative, find the derivative of the function

$$f(x) = \sqrt{6x}$$

(b) Find the derivative of $y = (\sin x)^{2 \ln x}$