

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



Test 1

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 3 questions and 5 pages in this exam.

Question	Points	Score
1	20	
2	18	
3	12	
Total:	50	

Exam Version: **A**

Question 1 (20 points)

Choose the correct answer for each of the following:

(1) If $\lim_{x \rightarrow -2} \frac{2+x}{x^2+5x+6}$

A. 5

B. $\frac{1}{5}$

C. 1

D. -5

E. -1

F. $-\frac{1}{5}$

(2) If $y = \sqrt{\sec x + e^{-x}}$, then $y' =$

A. $\frac{\sec x \tan x - e^{-x}}{\sqrt{\sec x + e^{-x}}}$

B. $\frac{\sec x \tan x - e^{-x}}{2\sqrt{\sec x + e^{-x}}}$

C. $\sec x \tan x - e^{-x}$

D. $\frac{1}{2\sqrt{\sec x + e^{-x}}}$

E. $\frac{\tan^2 x - e^{-x}}{2\sqrt{\sec x + e^{-x}}}$

F. $\frac{\sec x \tan x + e^{-x}}{2\sqrt{\sec x + e^{-x}}}$

(3) At what points is the function $f(x) = \sqrt{3x-9}$ continuous?

A. $(3, \infty)$

B. $(\infty, 3)$

C. $[9, \infty)$

D. $[-3, \infty)$

E. $(-\infty, 3]$

F. $[3, \infty)$

(4) $\lim_{x \rightarrow 0} \frac{|x-2|}{x-2} =$

A. -1

B. 1

C. 2

D. -2

E. 0

F. ∞

(5) If $f(x) = \frac{4}{x+5}$, then the value of $f'(0)$ is

A. $-\frac{4}{5}$

B. $\frac{4}{25}$

C. $\frac{4}{5}$

D. $\frac{-4}{25}$

E. 0

F. $-\frac{1}{25}$

$$(6) \lim_{x \rightarrow 1^+} \frac{2x - 3}{x^2 - 1} =$$

A. -3 B. $-\infty$ C. 2 D. -1 E. 0 F. ∞

$$(7) \lim_{x \rightarrow \infty} \frac{\sqrt{x^2}}{x} =$$

A. -1 B. ∞ C. $-\infty$ D. 0 E. 1 F. 2

$$(8) \text{ If } y = \sqrt[7]{x^3}, \text{ then } y' =$$

A. $\frac{3}{7}x^{\frac{3}{7}}$ B. $x^{\frac{-4}{7}}$ C. $\frac{3}{7}x^{\frac{-4}{7}}$ D. $\frac{7}{3}x^{\frac{4}{3}}$ E. $\frac{3}{7}x^{\frac{-3}{7}}$ F. $\frac{4}{7}x^{\frac{-4}{7}}$

$$(9) \text{ If } 3 - x^2 \leq f(x) \leq 3 + x^2 \text{ for all } x, \text{ then } \lim_{x \rightarrow 0} f(x) =$$

A. 4 B. 5 C. 3 D. 2 E. -3

F. None of the above

$$(10) \lim_{x \rightarrow \infty} \frac{\sqrt{4x^2 + 1}}{3x - 5} =$$

A. $\frac{1}{3}$ B. $\frac{2}{3}$ C. $\frac{4}{3}$ D. $\frac{3}{2}$ E. $\frac{-3}{2}$ F. 2

Question 2 (18 points)

- (a) Find the derivative y' of the following function: (**Do not simplify**)

$$y = [x \sin(2x) + \tan^4(x^7)]^5$$

- (b) Let $f(x) = \frac{x^2 - 4}{x^2 + 4}$. Find $f'(-2)$.

- (c) Find the value(s) of a so that

$$f(x) = \begin{cases} x^2, & x \leq 2 \\ a^2 - 3x^2, & 2 < x \end{cases}$$

is continuous at every x .

Question 3 (8 + 4 points)

(a) Use the definition of the derivative to find $f'(x)$ if $f(x) = \sqrt{x+5}$.

(b) Given that $f'(x) = \frac{x}{x^2+1}$ and $g(x) = \sqrt{3x-1}$. Find $(f \circ g)'(x)$ (**Simplify your answer**).