

University of Bahrain
 Department of Mathematics
 MATHS101: Calculus I
 Spring 2017



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.
- Only simple calculators are allowed. Graphical calculators nor 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 is 2 question consists of 17 multiple choice questions. Total of 6 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	34	
2	16	
Total:	50	

Exam Version: **C**

Question 1 (34 points)

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

(1) If $y = x^{5x}$, then $y' =$

A. $x^{5x} \left[\frac{5}{x} \right]$

B. $5x^{4x}$

C. $x^{5x} [5 \ln x + 5]$

D. $x^{5x} [5 \ln x + 1]$

E. $x^{5x} \ln x$

F. $x^{5x} [\ln x + 1]$

(2) If $y = \sec^3(5x)$, then $y' =$

A. $15 \sec^2(5x)$

B. $3 \sec^3(5x) \tan(5x)$

C. $3 \sec^2(5x)$

D. $15 \sec^3(5x) \tan(5x)$

E. $15 \sec^2(5x) \tan^2(5x)$

F. $15 \tan^2(5x)$

(3) If $y = (e^x + 5x)^5$, then $y' =$

A. $(e^x + 5x)^5 (e^x + 5)$

B. $(e^x + 5x)^4 (e^x + 5)$

C. $5 (e^x + 5x)^4 (e^x + 5x)$

D. $(e^x + 5x)$

E. $5 (e^x + 5x)^4 (e^x + 5)$

F. $5 (e^x + 5x)^4$

(4) $\int (e^x - x^5 - \cos x) dx$

A. $e^x - \frac{x^5}{5} - \sin x + C$

B. $e^x - x^6 - \sin x + C$

C. $e^x - \frac{x^6}{6} + \sin x + C$

D. $e^x - 5x^4 + \sin x + C$

E. $e^x - 5x^4 - \sin x + C$

F. $e^x - \frac{x^6}{6} - \sin x + C$

$$(5) \int \frac{5}{|x|\sqrt{x^2-1}} dx$$

A. $5 \tan^{-1} x + C$

B. $5 \sin^{-1} x + C$

C. $5 \sec x + C$

D. $5 \cos x + C$

E. $5 \sec^{-1} x + C$

F. $5 \tan x + C$

$$(6) \text{ If } \int \left(\csc x \cot x - \frac{5}{x} \right) dx$$

A. $-\csc x - 5 \ln |x| + C$

B. $-\csc x - \frac{5}{x^2} + C$

C. $-\csc x + \frac{5}{x^2} + C$

D. $-\cot x - 5 \ln |x| + C$

E. $\csc x - 5 \ln |x| + C$

F. $-\sec x - 5 \ln |x| + C$

$$(7) \text{ If } g(x) = f(\cos x) \text{ and } f'\left(\frac{1}{2}\right) = 8, \text{ then } g'\left(\frac{\pi}{3}\right) =$$

A. $-\frac{\sqrt{3}}{2}$

B. $\sqrt{3}$

C. $-4\sqrt{3}$

D. $-2\sqrt{3}$

E. $-5\sqrt{3}$

F. $-3\sqrt{3}$

$$(8) \text{ If } y = 3 \sin x^3, \text{ then } y'' =$$

A. $27x^4 \sin x^3 + 18x \cos x^3$

B. $27x^4 \sin x^3 - 18x \cos x^3$

C. $27x^4 \sin x^3$

D. $-27x^4 \sin x^3 + 18x \cos x^3$

E. $18x \cos x^3$

F. $9x^2 \cos x^3$

(9) An equation of the tangent line of $y = x^3 + 5$ at $(0, 5)$ is

A. $y = 5$

B. $y = x$

C. $y = -5$

D. $x = 5$

E. $y = 3x + 5$

F. $y = 5x + 5$

(10) If $y = x^5 \tan x$, then $y' =$

A. $5x^4 \tan x$

B. $5x^4 \tan x + x^5 \sec^2 x$

C. $5x^4 \sec^2 x$

D. $\sec^2 x$

E. $x^5 \sec^2 x$

F. $5x^4$

(11) If $y = \frac{5x + 1}{x + 1}$, then $y' =$

A. $\frac{5}{(x + 1)}$

B. 5

C. $\frac{10x + 6}{(x + 1)^2}$

D. $\frac{5}{(x + 1)^2}$

E. $\frac{4}{(x + 1)^2}$

F. $\frac{5}{(x + 1)^2}$

(12) If $y = 5^{\ln x}$, then $y' =$

A. $(\ln x)5^{\ln x - 1}$

B. $\frac{5^{\ln x}(\ln 5)}{x}$

C. $\frac{5^{\ln x}(\ln 5)}{x}$

D. $5^{\ln x}(\ln 5)$

E. $\frac{5^{\ln x}}{x}$

F. $5^{\ln x}$

(13) Let $y = 2x^2$ and $\frac{dx}{dt} = 4$. When $x = 1$, $\frac{dy}{dt} =$

A. 24

B. 0

C. 32

D. 16

E. 40

F. 4

(14) If $y + \cos y = x^5$, then $y' =$

A. $\frac{5x^4}{1 - \cos y}$ B. $\frac{5x^4}{-\sin y}$ C. $\frac{5x^4}{1 - \sin y}$ D. $\frac{5x^4}{1 + \sin y}$ E. $\frac{5x^4}{\sin y}$ F. $5x^4 + \sin y$

(15) The linearization (linear approximation) of $f(x) = x^5 + 5$ at $x = 1$ is $L(x) =$

A. $5x + 1$ B. $5x - 5$

C. 5

D. $5x + 6$ E. $5x + 11$ F. $5x$

(16) If $y = \log_5(x^4 + 7)$, then $y' =$

A. $\frac{4x^3}{(x^4 + 7)(\ln 5)}$ B. $\frac{4x^3(\ln 5)}{(x^4 + 7)}$ C. $\frac{1}{(x^4 + 7)(\ln 5)}$ D. $\frac{4x^3}{(x^4 + 7)}$ E. $\log_3(4x^3)$ F. $\frac{4x^3}{(x^4)(\ln 5)}$

(17) If $y = \sin 3 + e^3$, then $y' =$

A. 3

B. $\cos 3 + e^3$

C. 0

D. $-\cos 3 + e^3$ E. $\cos 3 + 3e^3$ F. $-\cos 3 + 3e^3$

Question 2 (16 points)

(a) Using the **definition** of the derivative, find the derivative $f'(x)$ of the function

$$f(x) = x^2 + 5x$$

(b) (i) If $y = x \tan^{-1} x - \frac{1}{2} \ln(1 + x^2) + 4x$, find the derivative y' and **simplify** your answer.

(ii) Use your answer in (i) to find $\int \tan^{-1} x \, dx$.