

Course Code: BIPH 1307
 Course Title: Applied math
 Due: 10-Jan-2019
 No. of Questions: (5 FIVE)
 Time: (2Hours)
 Using Calculator (Yes)

UNIVERSITY OF PALESTINE



Final Exam
 Grade : 50
 First semester 2018/2019

Instructor Name: _____
 Student No.: _____
 Student Name: _____
 Section No.: _____
 College Name: Pharmacy
 Using Dictionary (No)

QUESTION 1

Choose the best correct answer

(14 points)

1	If $\frac{d}{dx} f(x^2) = 2x^5 + 6x^3$, then $f'(x) =$ _____.						
a	$x^2 + 6x$	b	$x^2 + 3x$	c	$5x^{\frac{3}{2}} + 9\sqrt{x}$	d	$5x^2 + 9x$
2	If $y = \sec(t)$, $x = \tan(t)$, then $d^2 y / dx^2 =$ _____.						
a	$\cos(t)$	b	$\cos^2(t)$	c	$\cos^3(t)$	d	$\sin^2(t)$
3	If $m(x) = 2f(x) - 3L(x)$, and $\lim_{h \rightarrow 0} \left(\frac{f(2) - f(2+h)}{h} \right) = \lim_{z \rightarrow 0} \left(\frac{2-z}{L(z) - L(2)} \right) = 3$, then $m'(2) =$ _____.						
a	7	b	5	c	-5	d	3
4	Which of the following function is differentiable on its domain						
a	$ x - 2 $	b	$ x - 2 - x $	c	$\sqrt{x^2 + 2x + 1}$	d	$ x - 2 - x $
5	If $x = \cos(y)$, $y \in [0, \pi/2]$, then $\frac{dy}{dx} =$ _____.						
a	$\frac{1}{\sqrt{1 - x^2}}$	b	$\frac{-1}{\sqrt{1 - x^2}}$	c	$\frac{x}{\sqrt{1 - x^2}}$	d	$\frac{-x}{\sqrt{1 - x^2}}$
6	If $f(5+h) = f(5) + h^2 + 3h$, then $f'(5) =$ _____.						
a	-3	b	0	c	3	d	4
7	If $f(x)$ is continuous at $x = a$, then _____.						
a	$f'(a)$ D.N.E.	b	$f'(a) = 0$	c	$f'(a)$ exists	d	$f'(a)$ may exist
8	If $f(x) = \frac{1}{4}x^n$, $n \in R$, $f^{(4)}(x) = (a + 1)x^3$, the value of the constant a is _____.						
a	210	b	209	c	7	d	840
9	If $f(2) = 3$, $f'(2) = 0$, $f''(2) = -4$, where $f(x)$ has one local maximum, then the value of this local maximum is _____.						
a	-4	b	0	c	3	d	Can't be determined!

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QUESTION 2

Three branches

(9 points.)

1. Five students have separately measured the volume of the same blood sample, their readings are recorded in the following table:

	1 st reading	2 nd reading	3 rd reading	4 th reading	5 th reading
Volume (ml)	331	334	327	330	328

- (a) (1.5 POINT) Find , to the correct number of digits, the mean volume of the blood sample: \bar{V}
- (b) (1.5 POINT) Find, to the correct number of digits, the sample standard deviation: S_V
- (c) (1 POINT) Find, to the correct number of digits, the absolute standard error of the mean: $\sigma_{\bar{V}}$
- (d) (1 POINT) Find, to the correct number of digits, the relative standard error of the mean($\sigma_{\bar{V}}$)_{rel}
2. (2 POINTS) Find, to the correct number of digits, the mean value and the absolute standard error of the following calculation:
 $(15.152 \pm 0.005) + (14.51 \pm 0.04) - (17.0 \pm 0.03) = (\bar{X} \pm \sigma_{\bar{X}})$
3. (2 POINTS) Find, to the correct number of digits, the mean value and the absolute standard error of the following calculation:
 $(15.152 \pm 0.005) \div (3.0 \pm 0.03) = (\bar{y} \pm \sigma_{\bar{y}})$

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QUESTION 3

Three branches

(6 points)

1. Compute the following limits

(a) (1 POINT) $\lim_{x \rightarrow \infty} (\sqrt{x^2 - 1} - \sqrt{x})$

(b) (1 POINT) $\lim_{x \rightarrow 0} (x^2 \csc(x) \cot(x))$

2. Compute the following derivatives

(a) (1 POINT) $\frac{d}{dx} \left(\frac{\sqrt{x+2} - 2}{x+2} \right)$

(b) (1 POINT) $\frac{d}{dy} \left(\csc(x^3) \cot(\sqrt{x}) + \ln \left(\frac{3}{\sqrt{x^3}} \right) - e^\pi \right)$

3. Compute the following integrations

(a) (1 POINT) $\int_0^3 |w^2 - 1| dw$

(b) (1 POINT) $\int \frac{1}{w^3 + w} dw$

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QUESTION 4

Three branches

(10 points)

1. (2 POINTS) Find $f(x)$, where f is a continuous function satisfying the following relation:

$$\int_0^x f(t) dt = x \sin(x) + \int_0^x \frac{f(t)}{t^2 + 1} dt, \text{ for all real } x.$$

2. (2 POINTS) Find the dimensions of the biggest rectangle that can be inscribed in a circle of radius 5 cm.

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3. (4 POINTS) Let $f(x) = \int_1^{x^2 - x^3} \frac{1}{t^4 - 16} dt$, whose domain is $\mathcal{R} - \{-1\}$. Find all the critical points of $f(x)$

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3. (6 POINTS) Given the function $f(x) = \frac{2x^2 + x - 1}{x^2 - 1}$, $y' = \frac{-1}{(x - 1)^2}$
- (a) Identify the domain of f and any symmetries the curve may have.
 - (b) Find the critical points of f , if any, and identify the function's behavior at each one.
 - (c) Find where the curve is increasing and where it is decreasing.
 - (d) Find y'' .
 - (e) Find the points of inflection, if any, and determine the concavity of the curve.
 - (f) Identify any asymptotes that may exist.
 - (g) Graph the function.

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