

# Federal University Oye-Ekiti Department of Mathematics Second Semester Examination 2015/2016 Session

Course Code: MTH102

Course Title: Elementary Mathematics II

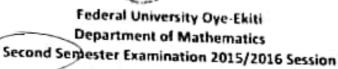
Unit: 3 units Duration: 1hour

Instruction: Answer all questions, choose and indicate clearly the correct option for each question.

Write your matriculation number and your department in spaces provided below.

Matriculation Number \_\_\_\_\_ Department\_\_\_\_\_

- 1) Find dy/dx if y=Insinx (a) 1/sinx (B) tanx (C) 1/cosx (D) Incosx.
- 2) Given that y=(5x²)(6/x) . Find dy/dx (a) 30x (B) 30 (C) -30 (D) -30x
- 3) If  $y = \cos(-2x)$ , dy/dx is (A)  $2\sin(-2x)$  (B)  $-2\sin(-2x)$  (C)  $\sin(-2x)$  (D)  $2\sin(2x)$ .
- 4) Given that  $y = 2x^2u^2z^2 + 6x^2u^4z^3$ , dy/dx is (A)  $4xu^2z^2 + 18x^2u^4z^3$  (B)  $4xu^3z^2 + 18x^2u^4z^3$  (C)  $4u^2z^2 + 18x^2u^4z^3$  (D)  $2x^2u^2z^2 + 18x^2u^4z^3$ .
- 5) Given that  $w = 40x^2y$ , what is  $d^2w/dx^2$  (a) 40y (B) 80y (C) 40x (D)  $40x^2y$
- 6) Given that  $w = 40x^2y$  then dw/dy is (A) 80xy (B)  $40x^4$  (C)  $80x^2y$  (D)  $40yx^2$ .
- 7) The point of removable discontinuity of  $f(x)=(x^2-4)/(x-2)$  is (a)4 (b)-4 (c)-2 (d)2
- 8) A local maximum point for the function  $f(x) = x^3 x$  is (a)  $\sqrt{3}/3$  (b)  $-\sqrt{3}/3$  (c)  $3\sqrt{3}$  (d)  $-3\sqrt{3} 3\sqrt{3}$
- 9) Let  $f(x) = (\frac{1}{2})x \sin(x)$  be defined on  $(0, 2\pi)$ , f(x) is increasing on the interval.
  - (a)  $(0, \pi/3)$  (b)  $(\pi/3, 5\pi/3)$  (c)  $(5\pi/3, 2\pi)$  (d) none of the above.
- 10) The minimum of  $f(x) = 2\sin(x) \cos(2x)$  on  $\{0, 2\pi\}$  is (a) -3/2 (b) -1/2 (c) 1/2 (d) 3/2.
- 11) The domain of the function  $f(x) = 2x^2 4x + 5$  is (a) R-{1} (b) R-{-1} (c) R (d) {1}
- 12) Given that  $f(x) = 3^{\circ}$ . Find f(x)f(2+x). (a)  $g(3^{\circ})$  (b)  $g(3^{\circ})$  (c)  $g(3^{\circ})$  (d)  $g(3^{\circ})$
- 13) The range of f: Z to Z' defined as f(x)=10|x| is (a)Z (b) Z' (c) 10|x| (d)  $\{10x:x \text{ is in }Z'\}$
- 14) The range of a signum function is (a) R (b) (-1, 0.1) (c) (-1, 1) (d) (0, 1)
- 15) The stationary point of  $x^2 x + 1$  is (a)  $\frac{1}{2}$  (b) 0 (c) 3 (d)  $\frac{1}{2}$ .
- 16) What is the floor of -2.4? (a)-3 (b) -2 (c) -1 (d) -5
- 17) Lim, ., (x<sup>2</sup>-4)/(x-2) is (a) 0 (b) -2 (c) -4 (d) 4
- 18) Integrate 5/x (a) In x + c (B) 5In x + c (C) 3In 5x + c (D) In 5x + c
- 19) All the following is a stationary point of  $x^5 5x^4 + 5x^3$  except (a) 0 (b) 1 (c) 2 (d) 3



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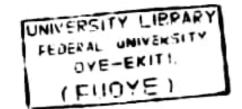
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Matriculation Number	Deportment
1) Find dy/dx if y=Insinx (a) 1/si	nx (B) tanx (C) 1/cosx (D) incosx.
	dy/dx (a) 30x (B) 30 (C) -30 (D) -30x
	2sin (-2x) (B) -2sin (-2x) (C) sin (-2x) (D) 2sin (2x).
	z <sup>3</sup> , dy/dx is (A) 4xu <sup>2</sup> z <sup>2</sup> + 18x <sup>2</sup> u <sup>4</sup> z <sup>3</sup> (B) 4xu <sup>3</sup> z <sup>2</sup> + 18x <sup>2</sup> u <sup>4</sup> z <sup>3</sup> (C) 4u <sup>2</sup> z <sup>2</sup> +
5) Given that $w = 40x^2y$ , what is	s d <sup>2</sup> w/ dx <sup>2</sup> (a)40y (B) 80y (C) 40x (D) 40x <sup>2</sup> y
6) Given that w= 40x² y then dv	w/dy is (A) 80xy (B) 40x <sup>2</sup> (C) 80x <sup>2</sup> y (D) 40yx <sup>2</sup> .
7) The point of removable disco	oritinuity of $f(x)=(x^2-4)/(x-2)$ is (a)4 (b) -4 (c) -2 (d) 2
8) A local maximum point for th	se function $f(x) = x^3 - x$ is (a) $\sqrt{3}/3$ (b) $-\sqrt{3}/3$ (c) $3\sqrt{3}$ (d) $-3\sqrt{3} - 3\sqrt{3}$
	fined on (0, 2n). f(x) is increasing on the interval.
(a) (0, n/3) (b) (n/3, 5n/3) (c)	(5n/3, 2n) (d) none of the above.
11) The domain of the function	x) - cos (2x) on [0, 2n] is (a) - 3/2 (b) - 1/2 (c) 1/2 (d) 3/2. $f(x) = 2x^2 - 4x + 5$ is (a) R-{1} (b) R-{-1} (c) R (d) {1}
	f(2+x). (a) 9(3*) (b) 3(9*) (c) 9(3 <sup>2</sup> *) (d) 3(9 <sup>2</sup> *)
13) The range of f: Z to Z' defin	ed as $f(x) = 10 x $ is (a)Z (b) Z* (c) $10 x $ (d) $(10x : x is in Z*)$
15) The same of a signum funct	tion is (a) R (b) {-1, 0, 1} (c) {-1, 1} (d) (0, 1)
16) What we want	-x+1 is (a) ½ (b) 0 (c) 3 (d) %.
	(a)-3 (b)-2 (c)-1 (d)-5 (a) 0 (b)-2 (c)-4 (d) 4
18) Integrate 5/x (a) in x + c (	B) 5ln x + c (C) 3ln 5x + c (D) ln 5x + c
19) All the following is a station	vary point of $x^3 - 5x^4 + 5x^3$ except (a) 0 (b) 1 (c) 2 (d) 3



## FEDERAL UNIVERSITY OYE-EKITI FACULTY OF SCIENCE DEPARTMENT OF MATHEMATICS

Second Semester Examination, 2014/2015 Session

MTH102 - General Mathematics II

3 units

INSTRUCTION: Answer four(4) questions in all with at least one question

from each section.

Duration: 21/hrs

#### Section A

Answer at least one question in this section.

- 1. (a) Let  $\sin \theta = \frac{4}{5}$ , where  $90 < \theta < 180^{\circ}$ . Find the exact values of  $\cos \theta$  and  $\tan \theta$ .
  - (b) Show that

$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

- (c) Evaluate each of the following trigonometric functions:
  - (i) cos 5 to
  - $(ii) \sin \frac{5\pi}{6}$
  - (iii) tan 57
- (d) Show that  $2\sin A\cos B = \sin(A+B) + \sin(A-B)$ .
- (a) If cos θ = 0.8, evaluate :
  - (i)  $\cos(180^{\circ} + \theta)$
  - (iii)  $\sin(90^{\circ} \theta)$ .
  - (b) Show that

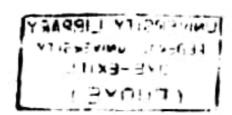
$$\tan \theta + \frac{\cos \theta}{1 + \sin \theta} = \sec \theta.$$

- (c) A circle has a radius of 6 inches. Find the length of the arc intercepted by a central angle of 150°.
- (d) If the length of arc intercepted by a central angle is \(\frac{16\pi}{3}cm\), find the radius of the circle.

#### Section B

Answer at least one question in this section.

- (a) Differentiate y = sinx from the first principle.
  - (b) Find the derivative of the function y = 3x² and the gradient of the tangent to the curve y = 3x² at the point with abscissa 3.





- (c) Find \( \frac{x}{2} \) and \( \frac{x}{2} \) at \( (x, y) = (1, 1) \) if  $x^3 + 3xy^2 + 4x + 2y = 16$
- (a) Differentiate the following:

(i) 
$$\frac{(x-1)}{(x+1)}$$
 (ii)  $e^x \ln x$ 

- (b) If x = sint and y = cos2t, find dy/dx.
- (c) Find the coordinates of the stationary points of the function

$$y=\frac{x^3}{3}-\frac{x^2}{2}-2x+5,$$

and determine their nature.

### Section C Answer at least one question in this section.

- 5. (a) Integrate the following functions with respect to x (i)  $x^3 + 4x^2 + 6x + 3$  (ii)  $\frac{1}{x^3} - 3x^5 + \sqrt{x} - 1$  (iii)  $e^x - \sin x + 4\cos x$ 
  - (b) By writing the integrand as partial fractions, find

$$\int \frac{8x+10}{4x^2+8x+3} dx$$

(c) Use the product rule of differentiation to verify

$$\frac{d}{dx}(xe^{2x}) = e^{2x} + 2xe^{2x}.$$

Hence, show that

$$\int xe^{2x}dx = \frac{xe^{2x}}{2} - \frac{e^{2x}}{4} + c$$

6. (a) Evaluate

(i) 
$$\int_0^1 e^{3x} dx$$

(ii) 
$$\int_{-1}^{1} 5x^3 + 4x dx$$
 (iii)  $\int_{0}^{\pi} \sin 2x dx$ 

(iii) 
$$\int_0^{\pi} \sin 2x dx$$

(b) Approximate to six decimal places

$$\int_{1}^{3} e^{x3} dx$$

using Simpson's rule for n = 8.

(c) Find the area enclosed by the curve  $y = x^3 - 2x^2 - x + 2$ , the x-axis and the lines x = -1 and x = 2.