

CHUKA



UNIVERSITY

## SUPPLEMENTARY / SPECIAL EXAMINATIONS

## FIRST YEAR EXAMINATION FOR THE AWARD OF BACHELOR DEGREE

## MATH 101: FOUNDATION MATHEMATICS

## STREAMS:

TIME: 2 HOURS

DAY/DATE: MONDAY 16/11/2020

5.00 P.M - 7.00 P.M.

## INSTRUCTIONS:

Answer All Questions.

## QUESTIONS ONE: 30 MARKS

(a) Evaluate  $\frac{3 + \sqrt{5^2 - 3^2} + 2^3}{1 + (4 \times 6) \div (3 \times 4)} + \frac{15 \div 3 + 2 \times 7 - 1}{3 \times \sqrt{4} + 8 - 3^2 + 1}$  (4 marks)

(b) Solve the equation  $4(2r - 3) - 2(r - 4) = 3(r - 3) - 1$  (3marks)

(c) Solve simultaneously  $\frac{1}{2a} + \frac{3}{5b} = 4$   
 $\frac{4}{a} + \frac{1}{2b} = 10.5$  (4 marks)

(d) Solve  $2x^2 + 9x + 8 = 0$  to three significant figures, by completing square method. (3 marks)

(e) Use the properties of logarithms to solve  $\log_2(x^2 - 6x) = 3 + \log_2(1 - x)$  for  $x$ : (3marks)

(f) Work out  $({}^4P_2) (5 + 3x) \binom{5}{2} = 1140$  (3marks)

(g) a) Write down the first five terms of the expansion of  $(1 - \frac{x}{3})^5$  (2 marks)

b) Using the first three terms of the expansion. Find the values of  $(1.01)^5$  to 4dp. (2marks)

(h) Find the radius and the co-ordinates of the centre of a circle whose equation is

$$\frac{1}{2}x^2 + \frac{1}{2}y^2 - 3x + 4y + 6\frac{3}{8} = 0 \quad (3\text{marks})$$

(i) Find the differential coefficient using the method indicated in the bracket (6 marks)

(i)  $y = \frac{2}{5}x^3 - \frac{4}{x^3} + \sqrt[4]{x^5} + 7$  (Power rule)

(ii)  $y = \frac{2}{(2t-5)^4}$  (Chain rule)

**QUESTIONS TWO: 20 MARKS**

(a) Work out (6 marks)

(i)  $\sum_{i=1}^{35} (-45 + 5i)$

(ii)  $\sum_{n=0}^{20} 4(0.6)^n$

(b) Evaluate  $\frac{\sqrt{14}}{\sqrt{7}-\sqrt{2}} - \frac{\sqrt{14}}{\sqrt{7}+\sqrt{2}}$  by rationalizing the denominator (3 marks)

(c) Work out  $\int \left( \frac{2x^3 - 3x}{4x} \right) dx$  (3 marks)

(d) Given the polynomial,  $P(x) = 2x^3 - 3x^2 - 7x - 6$ . Find (3 marks)

(i)  $P(-2)$

(ii)  $P(1)$

(iii)  $P(-3)$

(e) The data below represent masses to the nearest kilogram of fish caught in a day.

Masses	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29
No. of fish	5	20	10	10	5

Determine:

(i) Mean (2 marks)

(ii) Standard deviation (3 marks)

**QUESTIONS THREE: 20 MARKS**

- (a) Divide using long division. State the quotient,  $q(x)$ , and use remainder theorem to find,  $r(x)$ .  
 $(6x^3 + 17x^2 + 27x + 20) \div (3x + 4)$  (5 marks)
- (b) (i) Find the equation of the tangent and normal to the curve  $y = \frac{4}{x}$  at  $x = 1$ . (5 marks)
- (i) Find and classify the turning points of the curve represented by  $y = x^3 + 3x^2 - 9x - 4$  (6 marks)
- (ii) Hence sketch the curve  $y = x^3 + 3x^2 - 9x - 4$  (4 marks)
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