CHUKA UNIVERSITY

UNIVERSITY EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE DEGREE OF BACHELORS OF EDUCATION ARTS

MATH 100: GENERAL MATHEMATICS

STREAMS: BeD Arts Y1S1 **TIME: 2 HOURS**

DAY/DATE: MONDAY 13/08/2018 **2.30 P.M - 4.00 P.M**

INSTRUCTIONS:

- Answer question **ONE** and **TWO** other questions
- Sketch maps and diagrams may be used whenever they help to illustrate your answer
- Do not write on the question paper
- This is a **closed book exam**, No reference materials are allowed in the examination room
- There will be **No** use of mobile phones or any other unauthorized materials
- Write your answers legibly and use your time wisely

QUESTION ONE: [30 MARKS]

a. State the properties of real numbers in the equations below [3 Marks]

i. $3(2x + 5) = 6x + 15$

ii. $14(8) = 8(14)$

iii. $(7 + 8) + 6 = 7 + (8 + 6)$

b. Classify the following numbers [3 Marks]

i. ½

ii. $\sqrt{5}$

iii. $\sqrt{-4}$

c. Evaluate without using a calculator $\dfrac{4^{1.5} \times 8^{\frac{1}{3}}}{2^2 \times 32^{-\frac{2}{5}}}$ [5 Marks]

d. Factorize the expression $3x^2 + 5x + 0.75$ [4 Marks]

e. Solve $log x = 1 + \log(x-3)$ [3 Marks]

f. The function f is defined by $f(x)=.$ Evaluate f (-3) [2 Marks]

g. Which is steeper at $x=2$ between the curves $y=x^3+2x+5$ and $y=x^3-2x^2+2$?

[5 Marks]

h. A survey of 500 randomly chosen individuals is conducted. The individuals are asked to name their favorite sport. The pie chart in Figure 1 summarizes the results of this survey.

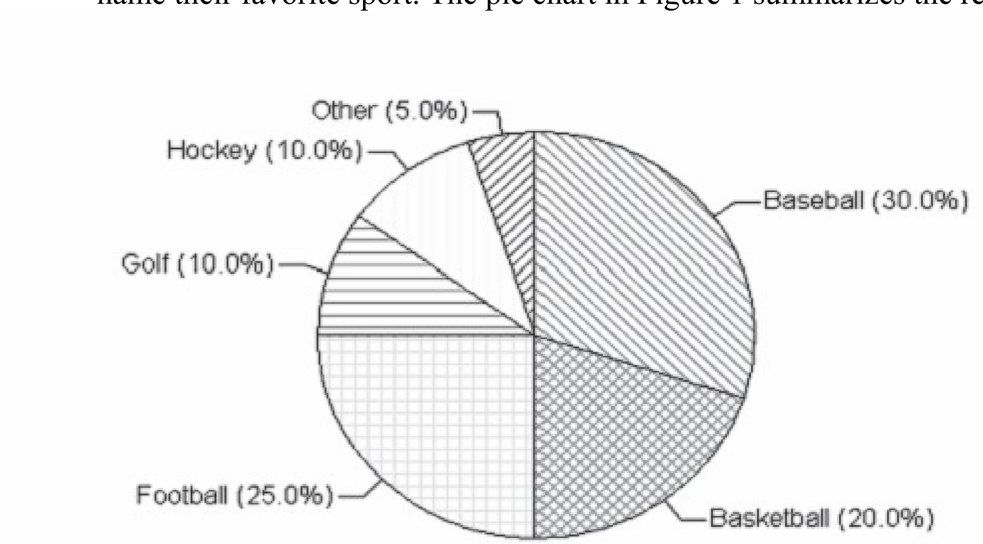

Figure 1

(i) How many individuals in the 500 gave football as their favorite sport? [2 Marks]

(ii) How many gave a sport other than basketball as their favorite sport? [3 Marks]

QUESTION TWO: [20 MARKS]

a. Use long division method to show that $2x^3+x^2-13x+6$ is divisible by $(x-2)$

Confirm your result above using the factor theorem.

Hence solve $2x^3+x^2-13x+6=0$ [10 Marks]

b. Solve the quadratic equation $\frac{x+1}{x-1}=x-3$ [5 Marks]

c. Differentiate the function $y=2x^2+3$ from first principles [5 Marks]

QUESTION THREE: [20 MARKS]

a. Functions f and g are defined by $f: x 3x-5$ and $g: x 3-2x.$ Evaluate:

(i) $(f+g)(-1)$ [2 Marks]

(ii) $f(2x)-4g(x)$ [3 Marks]

(iii) $f^{-1}(10)$ [3 Marks]

(iv) $(gf)(x)$ [2 Marks]

b. Using the functions $f(x)$ and $g(x)$ in (a) above show that $(f\circ g)(x)\neq(g\circ f)$ [4 Marks]

c. Given the function whose equation below

$$f(x)=\begin{cases} 3x^2+4, \ if \ \ x \le 4 \\ 10, \ if \ \ -4 \le x \le 15 \\ 1-x \ \ if \ \ \ x > 15 \end{cases}$$

Calculate

i. f(-5) [2 Marks]

ii. f(2) [2 Marks]

iii. f(20) [2 Marks]

QUESTION FOUR:[20 MARKS]

a) Evaluate the following

(i) $\log_2 73.45$ (using a calculator) [2 Marks]

(ii) $3\log 5 - \frac{1}{2}\log 2500 + 2\log 20$ (without the use of a calculator) [4 Marks]

b) Show that $\sqrt[lm]{\frac{a^c}{a^m}} \times \sqrt[mn]{\frac{a^m}{a^n}} \times \sqrt[nl]{\frac{a^n}{a^l}}$ =1 [4 Marks]

c) Find the gradient of the curve $\frac{x^2+2}{x-5}$, at the point x = 1 [4 Marks]

d) Find $\frac{dy}{dx}$ of the following using the indicated techniques in the bracket

i. $y=(-x^2+2)(5x^3+4)$ (Product rule) [3 Mark]

ii. $2x+1$
¿
¿
$y=$¿ (Chain rule) [3 Marks]

QUESTION FIVE: [20 MARKS]

The data given below refer to the gain of each of a batch of 40 transistors, expressed correct to the nearest whole number. Form a frequency distribution for these data having 4 classes from 70 – 74. [3 Marks]

81	83	87	74	76	89	82	84
86	76	77	71	86	85	87	88
84	81	80	81	73	89	82	79
81	79	78	80	85	77	84	78
83	79	80	83	82	79	80	77

Calculate the i. Mean [3 Marks]

ii Median [3 Marks]

iii Mode [3 Marks]

iv 6^{th} decile [3 Marks]

v Standard deviation [5 Marks]

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