

UNIVERSITY OF FORT HARE

MAT 304

MAIN DEGREE EXAMINATIONS

Oct/Nov 2024

Time: 3 HOURS

Subject: History and undamental Concepts

Marks: 100

This paper consists of 3 pages including cover page

Internal Examiner

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Instructions

All questions may be answered

Write in full sentences

Sloppy work will be penalized

Question 1

1. What is the *aim* and *ambition* of the study of History of Mathematics? [2]
2. (a) If N is a number to base 10, explain how N can be expressed to any arbitrary base b . [5]
(b) Express the number 2359 in **Egyptian hieroglyphic** numerals. [5]
3. (a) Write short notes on *Plimpton 322* [5]
(b) Write brief notes on the history of *Pythagorean Brotherhood*. [6]
4. Distinguish between *perfect* and *amicable numbers*, and give an example of each. [5]

Question 2

1. State the four main differences between **Hindu** and **Greek** Mathematics. [8]
2. (a) What were the **Middle Ages**? [3]
(b) Mention any two mathematicians and their works during this period. [4]
3. (a) Briefly discuss *Euler's History* in detail. [6]
(b) State and explain Fermat's *fundamental principle of analytic geometry*. [3]

Question 3

1. State accurately the famous three *laws of planetary motion*. [6]
2. Describe the four general steps in the development of *Calculus*? [8]
3. What were the three vital and distinct lines of development during the first 300 years of Greek Mathematics? [5]
4. There exist numbers a and b with $a > b$ such that $\frac{a}{b} = \frac{a+b}{a} = \xi$.
(a) Use the above description to deduce that $\xi = 1 + \frac{1}{\xi}$.
Hence, compute the approximate value of ξ . [5]
(b) Demonstrate how this value of ξ occurs naturally in the Fibonacci sequence. [3]

Question 4

1. Fermat followed the following procedure to divide a quantity into two parts such that the product of the two parts is a maximum. Using capital letter consonants for constants, and capital letter vowels for variables, he proceeded as follows: Let B be the given quantity; Form $(A - E)(B - (A - E))$ and equate this to $A(B - A)$; Let $E = 0$.
Follow this procedure and show that the equation results in $2A = B$. What conclusion can be drawn from this result? [5, 2]

2. Copy and complete the following table of mathematician(s) and their contributions in the fields of mathematics. [5]

Mathematician(s)	Field of Contribution
Fermat —	— is one of the first to discuss conics as curves of second degree rather than as sections of a cone
Huygens — —	— described the laws of planetary motion. is thought to be the first to realise in full that differentiation and integration are inverse operations.

3. Discuss the lives and major mathematical works of the mathematicians listed below.
 - (a) Archimedes [5]
 - (b) Blaise Pascal [5]

END OF EXAMINATION

