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Tutorial Quiz 2018

Akadem Mathematics Exam

Exponentials, Logarithms, Sequences and Series

Reading time: 2 minutes
Writing time: 60 minutes

Student Name: _____
University ID: _____

Question and Answer Book

Structure of Book

Number of questions	*Number of questions to be answered*	*Number of marks*
2	2	10

- Students are NOT permitted any notes during the quiz.
- Students are NOT permitted to colaborate in any form during the quiz. Any signs of collaboration or cheating will result in a nullified score and the course convenor will be informed of any academic misconduct.

Materials supplied
- Question and answer booklet of 5 pages.
- Working space is provided throughout the booklet.
- Calculators are permitted.

Instructions
- Write your **student number** in the space provided above on this page.
- All written responses must be in English.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

Intructions

Answer **all** questions in the space provided.
In all questions where a numerical answer is required, an exact value must be given unless otherwise specified.
In questions where more than one mark is available, appropriate working **must** be shown.
Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Exponentials and Logarithms

Question 1

Simplify the expression

$$\frac{x^2 + y^4}{(\sqrt{x})^{-1} + \frac{2}{5y^{-3}}}.$$

[3 marks].

Question 2

Solve the equation

$$2^x - 5 + \frac{6}{2^x} = 0,$$

for $x \in \mathbb{R}$. [4 marks].

Question 3

Let $f : (0, \infty) \to \mathbb{R}$ be the function defined by $f(x) = 3 - \log_e(1 - x)$. State the transformations necessary to map $g(x) = \log_e(x)$ to $f(x)$. [3 marks].

Turn Over

Sequences and Series

Question 1

Determine the values of $r, s \in \mathbb{R}$ such that the sequence $\{2, r, 13, s, ...\}$ is an arithmetic sequence.

[3 marks].

Question 2

For $n \in \mathbb{N}$, define the geometric sequence t_n by the formula

$$t_n := 4 \cdot 7^{n-1}.$$

Evaluate the sum of the first 10 terms of t_n. [3 marks].

Turn Over.

Question 3

A do-it-yourself picture-framing kit is avaialble in various sizes. Size 1 contains 0.8m of moulding, size 2 contains 1.5 m, size 3 contains 2.2m, and so on.

a. Form the sequence of lengths of moulding. [2 marks].

b. Is the sequence of lengths of moulding an arithmetic sequence? [2 marks].

c. Find the length of moulding contained in the largest kit, size 12. [4 marks].

Question 4

A ball dropped from a height of 15 m rebounds from the ground to a height of 10 m. With each successive rebound, it rises to two-thirds of the height of the previous rebound. What total distance will it have travelled when it strikes the ground for the 9th time? [3 marks].

Question 5

For a sequence given by

$$t_n = 5(3 - n),$$

find the sum of the first 3 terms. [3 marks].

END OF TUTORIAL EXAM.