

**UNIVERSITY OF FORT HARE**

**AMB 111F**

**DEGREE EXAMINATIONS**

**JUNE 2023**

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**Time: 3 HOURS**

**Subject: INTRODUCTION TO BUSINESS MATHEMATICS**

**Marks: 100**

**This question paper consists of 3 pages**

**Internal examiner(s)**

Mr. N. Katywa  
Dr I. K Appiah

**Instructions**

Answer All questions.  
Symbols have the usual meanings.

## Question One

- 1.1. Let  $A = [-5,7)$  and  $B = (2,11]$ . Find, with the aid of a number line, the following intervals:
- (i)  $A \cap B$
  - (ii)  $A \cup B$
  - (iii)  $A - B$
  - (iv)  $A \oplus B$  (8)
- 1.2. Let  $A = \{x, y, z, w\}$  and  $B = \{a, b\}$ . Find the following sets:
- (i)  $A \times B$
  - (ii)  $B \times A$
  - (iii)  $A^2$
  - (iv)  $B^2$  (8)
- 1.3. Solve the following inequalities and present the solution on a number line and as an interval, Or union of intervals:
- (i)  $5x + 1 < 2x + 13$
  - (ii)  $x^2 \leq 4x + 12$
  - (iii)  $\left| \frac{2x-3}{x-1} \right| \leq 4$  (9)
- 1.4. Show that the function  $f: \mathbb{R} \mapsto \mathbb{R}$  define by  $4x - 1$  is bijective. (6)
- 1.5. Is the function  $f: \mathbb{R} \mapsto \mathbb{R}$  defined by  $f(x) = x^2$  a one-to-one function? Justify your answer. (5)

## Question Two

- 2.1. Find the domain and range of the following functions:
- (i)  $f(x) = \sqrt{3+x}$
  - (ii)  $f(x) = |x|$  (6)
- 2.2. Let  $L$  be the line  $y = -2x + 3$ . Find the equations of the lines:
- (i)  $L_1 \parallel L$  through  $(-1,3)$
  - (ii)  $L_2 \perp L$  through  $(2,3)$

- Sketch all 3 lines on the same  $xy$ -plane. Show clearly the  $x$  and  $y$  intercepts. (10)
- 2.3. Sketch the graph of the function  $-x^2 - 2x + 15$  showing all points. (6)
- 2.4. If  $f(x) = x^2 + x + 1$ ,  $g(x) = \sqrt{x}$  and  $h(x) = x - 1$ , find the composite functions:
- (i)  $g \circ f$
  - (ii)  $g \circ h \circ f$
  - (iii) Find the domain of (i) and (ii) (8)
- 2.5. Solve for  $x$  if  $5^x - 5^{x-1} = 20$  (3)

### Question Three

- 3.1. Calculate how long it takes R10 500 to become R350 500 if it is invested at 13% compound interest per annum:
- (i) calculated half-yearly
  - (ii) calculated monthly
- (6)
- 3.2. Thembi has an annuity to which she contributes R22 000 p.a (at the end of the year) at 9.5% annual Compound interest. The annuity will mature in 28 years. Calculate the present value of the annuity. (6)
- 3.3. Calculate the future value of the annuity in which R4 500 is invested at the beginning of each half-year, for 15 years, at an interest rate of 11% p.a compounded half-yearly. (5)
- 3.4. Office equipment depreciates at 10,5 % p. a. calculated half-yearly. What will the value of R2 025 Piece of equipment be after 10 years? (8)
- 3.5. They say that salaries must double in 7 years to keep up with the inflation rate. Calculate the inflation rate. (6)

END