

FINAL EXAM
FMTH006: APPLIED MATHEMATICS
Fall-T2 2024 – 25

Points of attention:

- For each question, the maximum earned points are specified in the question.
- Write clearly! Answers that are not readable are not marked and don't earn marks!
- All answers should be written in English using **blue or black pens** only.
- Use the pencil only for diagrams and graphs.
- Show all the calculation steps in the given space.
- When finished, submit and sign the question paper to the invigilator.
- Any cheating/copying may result in an instant failing of the examination.

Exam Duration: 2 hours
Instructor's Name: Muhammad Kazam
Exam Date: 09/02/2025
Program: FND

40

Student Information

Name: ID:
Signature:

Invigilator

Initials: ☐ Student ID checked
Time received:

Question 1.**[10 Marks]**

Circle the correct option to fill in the blanks.

Example. 85 is a _____ digit number.

- a. 1 **b. 2** c. 3 d. 4

- The domain of the function $f(x) = \frac{x}{x^2-1}$ is _____.
 a. $\mathbb{R}$ b. $\{x|x \neq 1\}$ c. $\{x|x \neq -1\}$ d. $\{x|x \neq \pm 1\}$
- The point _____ is not a solution of the inequality $3x + y > -6$.
 a. $(-1, -2)$ b. $(3, 1)$ c. $(0, 0)$ d. $(-3, -2)$
- If $P(\text{rain}) = 0.22$, then $P(\text{no rain}) =$ _____.
 a. 0 b. 0.44 c. 0.78 d. 1
- If two dice are rolled once, then the number of elements in the sample space is _____.
 a. 2 b. 4 c. 6 d. 36
- The median of the data 60, 74, 60, 62, 68, 68, 79, 62 is _____.
 a. 60 b. 62 c. 65 d. 60, 62 and 68
- The range of the data 45, 32, 37, 46, 39, 36, 41, 48, 36 is _____.
 a. 16 b. 39 c. 46 d. 48
- $f(x) = 2e^x$ is a _____ function.
 a. linear b. quadratic c. logarithmic d. exponential
- $f(x) = ax^2 + bx + c$ has a maximum value if _____.
 a. $a < 0$ b. $a > 0$ c. $a = 0$ d. $a \neq 0$
- $a^{\log_a x} =$ _____.
 a. 0 b. a c. x d. $\log_a x$
- If $2^{3x-2} = 1$, then $x =$ _____.
 a. 1 b. -1 c. $-\frac{2}{3}$ d. $\frac{2}{3}$

Question 2.**[3 Marks]**

Calculate the maximum or minimum value of the function given below.

$$f(x) = -x^2 - 1.2x + 16$$

Question 3.**[3 Marks]**

Use the Laws of Logarithms to expand the expression given below.

$$\log \left(\frac{\sqrt{x} \times \sqrt[3]{y}}{w^2 \times \sqrt{z}} \right)$$

Question 4.**[3 Marks]**

Solve the equation given below.

$$\log(3x + 5) - \log(2x + 4) = 0$$

Question 5.**[4 Marks]**

Determine the inverse of the function given below.

$$f(x) = \frac{x+2}{x-1}$$

Question 6.**[4 Marks]**

Solve the system of equations or show that it has no solution. If the system has infinitely many solutions, express them in the ordered-pair form.

$$3x + 2y = 10$$

$$2x + 5y = 3$$

Question 7.**[5 Marks]**

The percent of women employees in an organization can be modeled by the function,

$$P = \frac{65.32}{1 + 7.06e^{19.4x}}, \text{ where } P \text{ is the percent of women employees and } x \text{ represents the number of}$$

years since January 1, 1980.

a. Calculate the percent of women employees in 2015.

(1.5 marks)

b. Determine the year in which the women employees will be 20%.

(3.5 marks)

Question 8.**[8 Marks]**

A system of inequalities is given below.

$$-3x + 2y < 6; \quad x - 4y < -2; \quad 2x + y \leq 3; \quad x \geq 0; \quad y \geq 0$$

a. Graph the solution set of the system of inequalities.

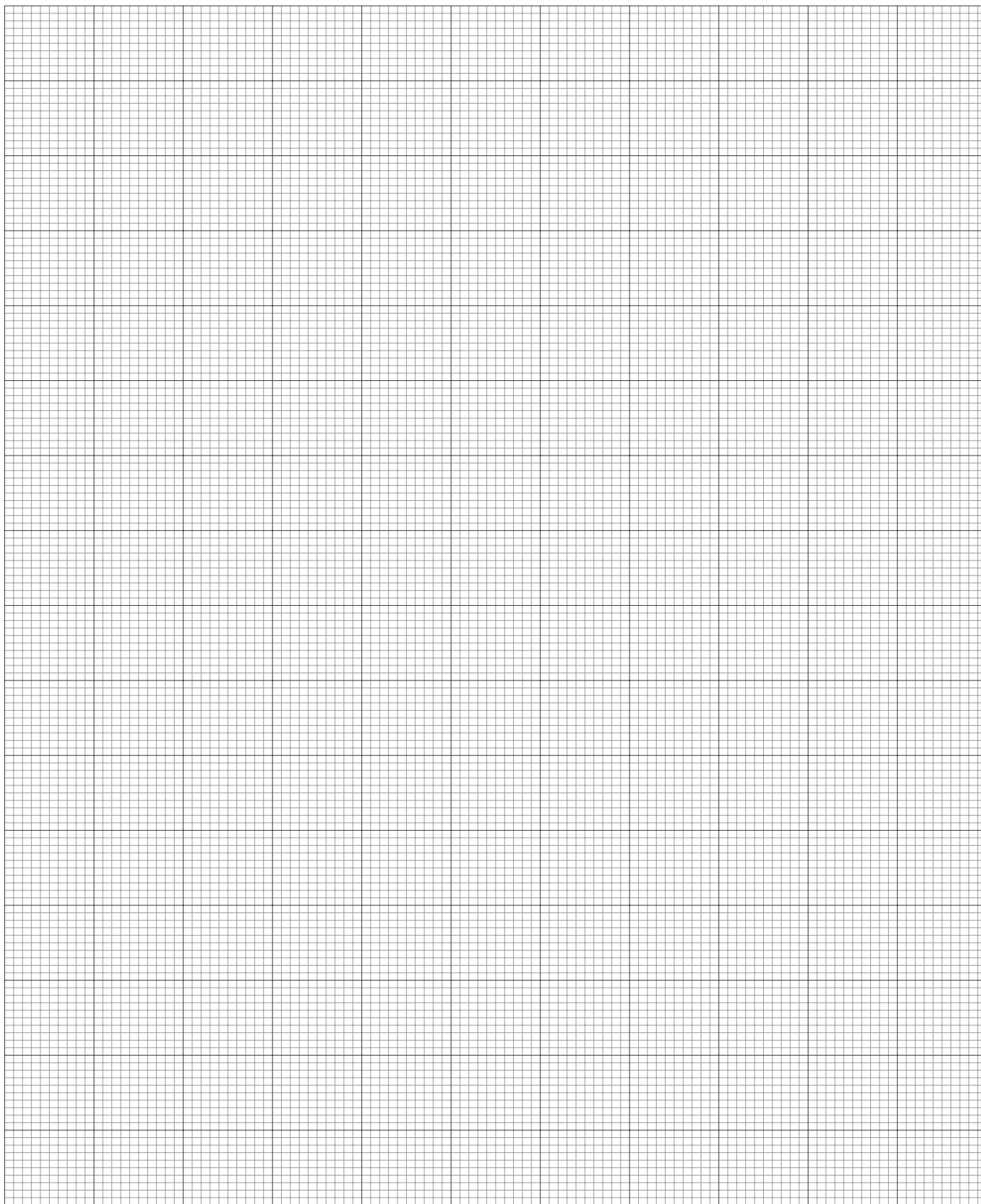
(6 marks)

b. Find the coordinates of all vertices.

(1 mark)

c. Determine whether the solution set is bounded or unbounded.

(1 mark)



Formula Sheet

Quadratic formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
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Reference:

Lial, M.L., Schneider, D.I. and Daniels, C.J. (2017) *College Algebra & Trigonometry*. 6th edn. Harlow: Pearson.