

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

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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 $f(x) = \frac{1}{\sqrt{3-x}}$ is _____.
 a. $\mathbb{R}$ b. $\{x|x \leq 3\}$ c. $\{x|x < 3\}$ d. $\{x|x > 3\}$
- If two lines are parallel, then the system has _____ solution.
 a. no b. one c. two d. infinitely many
- The point _____ is a solution of the inequality $3x + 2y \leq 2$.
 a. (1, 3) b. (-2, 1) c. (3, -1) d. (0, 5)
- If an event cannot happen, its probability will be _____.
 a. 0 b. $\frac{1}{2}$ c. $\frac{1}{3}$ d. 1
- The mode of the data 60, 74, 60, 62, 68, 68, 79, 62, 59, 68, 75, 62 is _____.
 a. 60 and 68 b. 62 and 68 c. 60 and 62 d. 60, 62 and 68
- The class mark for the group (12 – 19) is _____.
 a. 11.5 – 19.5 b. 12 c. 19 d. 15.5
- The axis of symmetry of the curve $f(x) = x^2 + x + 2$ is at $x =$ _____.
 a. 1 b. $\frac{1}{2}$ c. $-\frac{1}{2}$ d. -1
- If $g(x) = \frac{1-x}{1+x}$, then $g(-a) =$ _____.
 a. $\frac{a-1}{a+1}$ b. $\frac{a+1}{a-1}$ c. $\frac{a+1}{-a+1}$ d. $\frac{-a-1}{1-a}$
- $a^{\log_a x} =$ _____.
 a. 0 b. a c. x d. $\log_a x$
- If $5^{x+1} = 1$, then $x =$ _____.
 a. 0 b. 1 c. -1 d. 2

Question 2.**[5 Marks]**

The total annual sales of a book in either paper or electronic form are 3,500. Each paper copy of the book costs \$30 and each e-book costs \$25. The total cost is \$97,500.

a. Write down the simultaneous equations.

(1 mark)

b. Solve the equations to find the number of paper books and e-books sold.

(2 marks)

Question 3.**[3 Marks]**

Use the Laws of Logarithms to combine the expression and simplify them to the lowest of the terms.

$$\frac{1}{3}\log x^4y^5 - \frac{3}{4}\log x^2y$$

Question 4.**[6 Marks]**

Solve the equations given below for the variable x .

a. $\log_7(3x + 2) - \log_7(x - 2) = 1$

(2 marks)

b. $T = T_0 + (T_1 - T_0)10^{-kx}$

(4 marks)

Question 5.**[4 Marks]**

The total amount spent by Americans on shoes and clothing from 2000 to 2013 can be modeled by

$$f(x) = 0.7714x^2 - 3.693x + 297.9$$

where $x = 0$ represents 2000 and $f(x)$ is in billions of dollars.

a. In what year did spending on shoes and clothing reach a minimum?

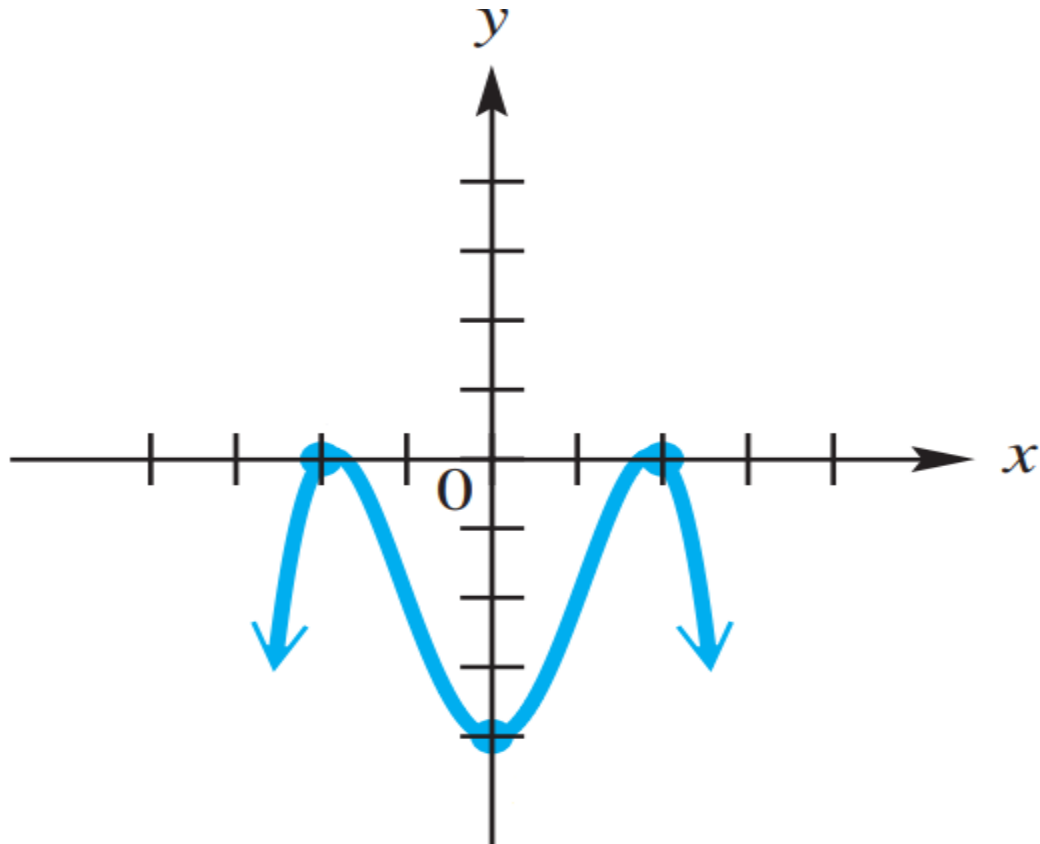
(2 marks)

b. Determine the minimum amount spent on shoes and clothing.

(2 marks)

Question 6.**[4 Marks]**

The graph of a function f is given below.



(Lial, Schneider and Daniels, 2017)

- a. Use the graph to find all the local maximum and minimum values of the function and the value of x at which each occurs. **(2 marks)**
- b. Use the graph to find the intervals on which the function is increasing and on which the function is decreasing. **(2 marks)**

Question 7.**[8 Marks]**

The system of inequalities is given below.

$$2x + 3y \leq 12; \quad 2x + 3y > -6; \quad x + 2y > 4; \quad x \geq 0; \quad y \geq 0$$

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

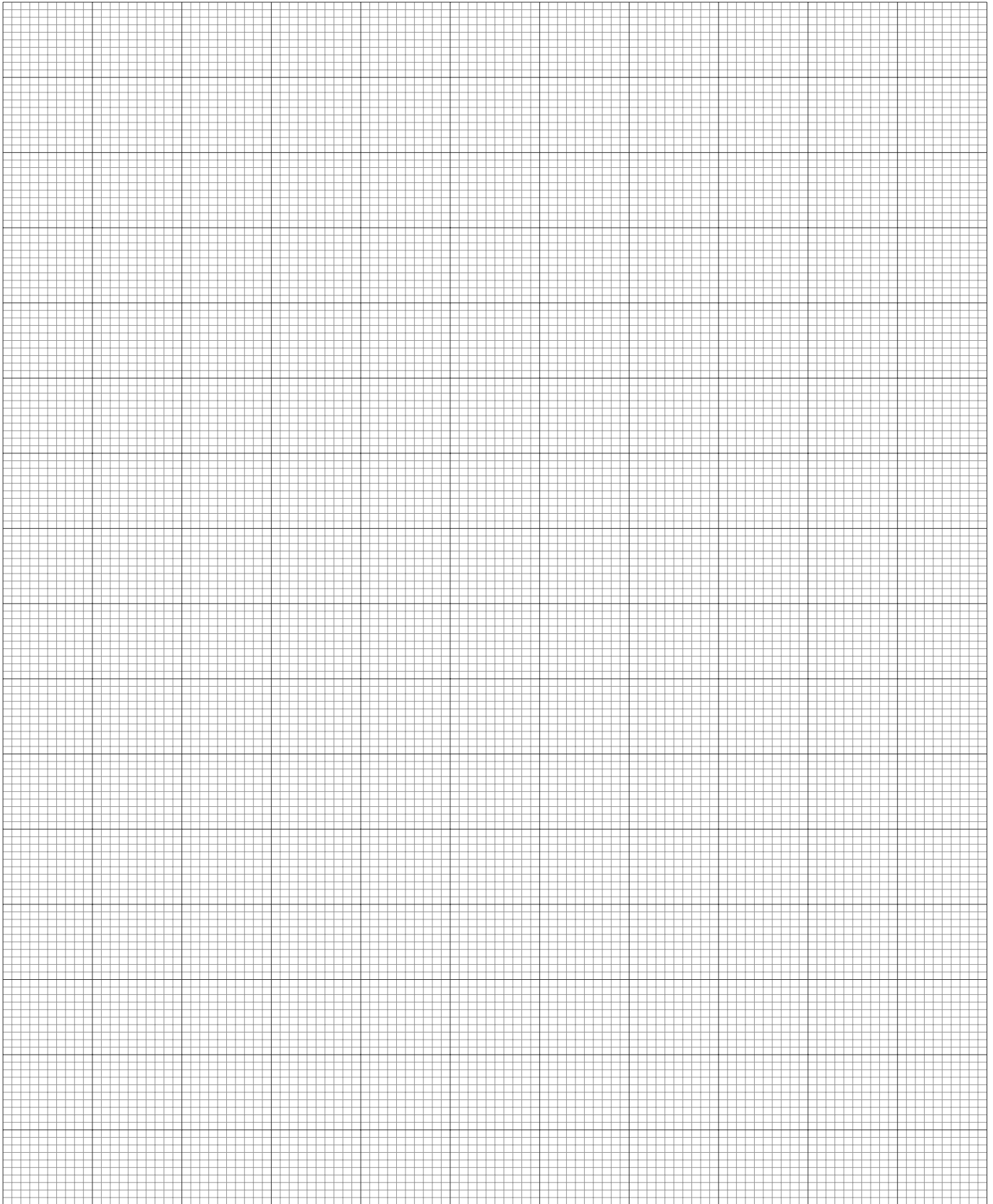
(6 marks)

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.