

Final Exam
MMATH-II: MATH 2
Spring 2026

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 the question paper, together with the answer scripts and the signed cover page to the invigilator.
- Any cheating/copying may result in an instant failing of the examination.

Exam Duration: 2 hours
Instructor's Name: Dr. Rokhsaneh Yousef Zehi
Exam Date: 13/05/2026
Program: ME

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	10

Student Information

Name: ID:
Signature:

Invigilator

Initials: ☐ Student ID checked
Time received:

Question 1**[4 marks]**

Determine all square roots of the complex number given below using De Moivre's theorem and express each root in **rectangular** form.

$$Z = -6 + 8j$$

Question 2**[6 marks]**

In an electrical network, three currents i_1 , i_2 , and i_3 flow through different branches of a circuit. By applying Kirchhoff's Voltage Law (KVL) and Kirchhoff's Current Law (KCL) to different loops and junctions in the circuit, the following system of linear equations is obtained:

$$2i_1 + i_2 - i_3 = 10$$

$$-i_1 + 3i_2 + 2i_3 = 5$$

$$4i_1 + i_2 + i_3 = 12$$

Using **Cramer's Rule**, determine the values of the currents i_1 , i_2 , and i_3 .

Question 3**[5 marks]**

For a four-terminal network, the voltage V is related to the coefficient matrix $A = \begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix}$

and the current $I = \begin{bmatrix} 5 \\ 2 \end{bmatrix}$ by:

$$V = A^{-1}I$$

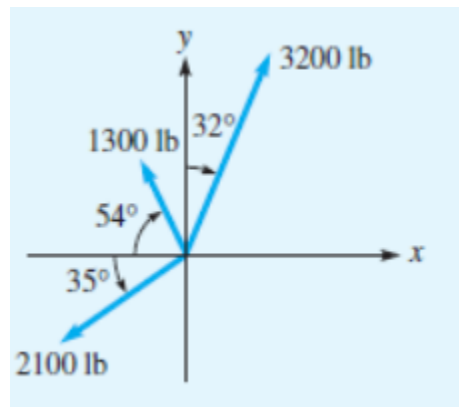


- Determine the inverse of matrix A using Gauss-Jordan Method. (3.5 marks)
- Determine the voltage values of v_1 and v_2 . (1.5 marks)

Question 4**[8 marks]**

Three forces of 3200 lb, 1300 lb, and 2100 lb act on a bolt as shown in figure below.

- a. Determine the x –component and y –component of the resultant force. (6 marks)
- b. Determine the magnitude and direction of the resultant force. (2 marks)



Question 5**[5 marks]**

Given that the points A and B have coordinates $A(4, -1)$ and $B(-3, 2)$ respectively, answer the following questions:

- a. State the position vectors of A and B . (1 mark)

- b. Determine the vector $\overrightarrow{AB}$. (1 mark)

- c. Find the magnitude of $\overrightarrow{AB}$. (0.5 marks)

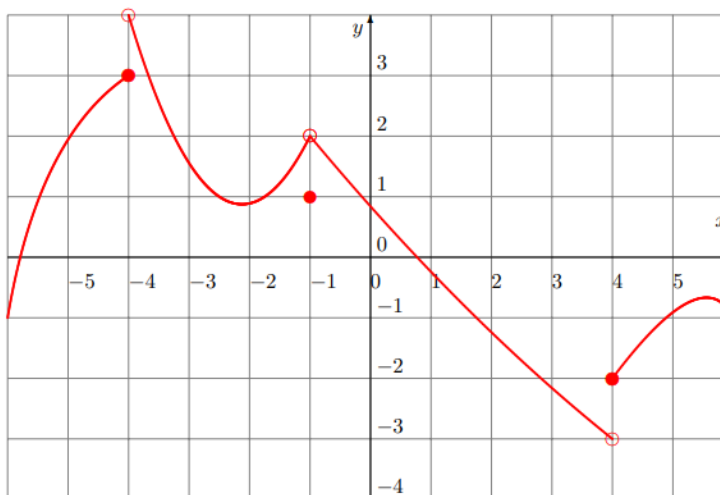
- d. Find the direction ratios of $\overrightarrow{AB}$. (0.5 marks)

- e. Find the scalar product of the position vectors of A and B . (0.5 marks)

- f. Find the angle between the position vectors of A and B . (1.5 marks)

Question 6**[3 marks]**

Consider the following function defined by its graph:



Evaluate the following limits:

a. $\lim_{x \rightarrow -1^+} f(x)$ (0.5 marks)

b. $\lim_{x \rightarrow -1^-} f(x)$ (0.5 marks)

c. $\lim_{x \rightarrow -1} [f(x)]^2$ (0.5 marks)

d. $\lim_{x \rightarrow 4^+} f(x)$ (0.5 marks)

e. $\lim_{x \rightarrow 4^-} f(x)$ (0.5 marks)

f. $\lim_{x \rightarrow 4} f(x)$ (0.5 marks)

Question 7**[9 marks]**

Determine the value of each of the following limits, if they exist. If a limit does not exist, provide a justification.

a. $\lim_{x \rightarrow \infty} \sqrt{x^2 + 4x} - x$ (3 mark)

b. $\lim_{x \rightarrow 0} \frac{\sqrt{1+2x} - \sqrt{1-x}}{x}$ (3 marks)

c. $\lim_{x \rightarrow -6} \frac{2x+12}{|x+6|} - 2$ (3 marks)

This page is for rough work.

MLO and Bloom's Level of Complexity

Q #	MLO Addressed	Complexity Level	Mark	Remark
1	1,2	Application	4	
2	2,3	Application	6	
3	3,4	Application- Analysis	5	
4	3,4	Application- Analysis	8	
5	1	Understanding -Application	5	
6	1	Understanding -Application	3	
7	1,2	Application-Analysis	9	

References:

Anthony Croft, R. D., 2015. Mathematics for Engineers. Fourth ed. Harlow: Pearson.

J. Washington, A., 2014. Basic Technical Mathematics with Calculus. 10 ed. Harlow: Pearson Education Limited.

Stewart, J., Redlin, L. and Watson, S. (2017) *Precalculus Mathematics for Calculus*. 7th ed. Cengage.