الجامعة الوطنية
National University
Science & Technology للعلوم والتكنولوجيا
كلية عمان البحرية الدولية
International Maritime College Oman

ACADEMIC YEAR 2023 - 2024

Program	Year	Semester	Paper
PE	**1**	**1**	**Midterm**

MODULE NAME:	**Technical Math I**		
MODULE CODE:	**TMATH-I**	**EXAM DATE:**	**9 Nov 2023**
INSTRUCTOR's NAME:	**Dr. Amer Alhabsi**	**DURATION:**	**2 hrs.**

Questions to be answered on:	**Allowed tools:**	**Number of pages**
✓ Space provided on the question paper	Pen, Pencil & Calculator	(Incl. cover page)**:** **7**

Points of attention:

- For each question, the maximum earned points are mentioned between brackets at the end of each question.
- Write very clearly! Answers that are not readable are not marked and don't get points!
- Make sure your answers are written to the point.
- All answers should be written **in English.**
- Write all the answers in **blue or black pen only.**
- Use the **pencil** only for **diagrams & 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.

FINAL MARKS

STUDENT NAME:

STUDENT ID:

Number of answer scripts:……..…….

Invigilator:……..……..…

Student's signature: ……

Time of receipt:……..….

1. (5 points) For the function $f(x) = \begin{cases} \frac{\sin x}{x} & \text{if } x \neq 0 \\ c & \text{if } x = 0, \end{cases}$

   1. find the limit $\lim_{x \to 0} f(x)$.
   2. find c such that the function is continuous at $x = 0$.

2. (15 points) Find $\dfrac{dy}{dx}$ for each of the following

1. $x \sin y = e^{2x} + y^2$

2. $y = 3\cos 2t$ and $x = \ln(t^2 + 1)$

3. $y = \left(e^{\sin x} + 1\right)^4$

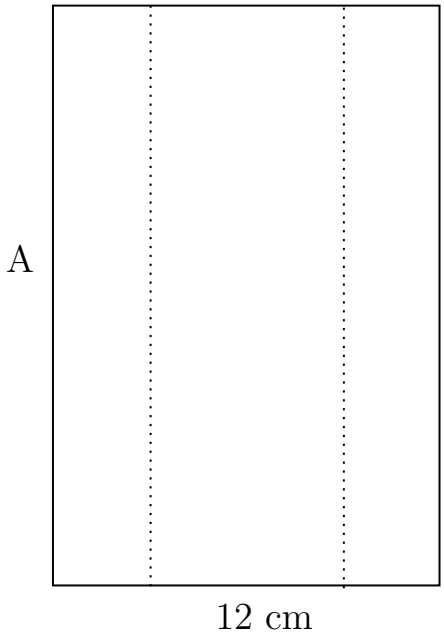
3. (10 points) In a rectangle, the width increases at a rate of $0.2\,\text{cm/s}$ while its length decreases such that the area remains constant at $600\,\text{cm}^2$. How fast is the length decreasing when the width is $12\,\text{cm}$?

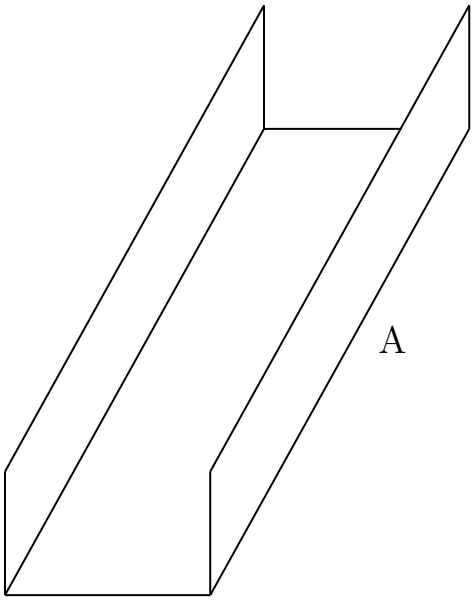
4. (5 points) Find the equation of the tangent of the curve $y = 1 + 2x - x^2$ when $x = 0$.

5. (5 points) Evaluate the integral

$$\int x(x^2+1)^8 \, dx$$

6. (10 points) We have a long metal sheet of width 12 cm and length A. It is desired to bend it at the dotted lines as shown in the figure. How should it be bent so as to maximize the volume.





Q #	MLO Addressed	Complexity Level	Mark	Comments
1	1	4	5	
2	1, 2	3	15	
3	2, 6	4	10	
4	1	4	5	
5	1	3	5	
6	2, 6	3	10	