



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023**

COURSE NAME : MATHEMATICS II
COURSE CODE : BBP 10403
PROGRAMME CODE : BBA/ BBB/ BBD/ BBE/BBG
EXAMINATION DATE : JULY/AUGUST 2023
DURATION : 3 HOURS

- INSTRUCTIONS
1. ANSWERS ALL QUESTIONS.
 2. THIS FINAL EXAMINATION IS CONDUCTED VIA **CLOSE BOOK**.
 3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK.

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

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Q1 (a) Sketch the graph of the following functions, find the domain and range.

i) $f(x) = 2x + 1$

(3 marks)

ii) $g(x) = |2x - 1|$

(3 marks)

(b) Complete the **Table Q1(b)** for appropriate domains of functions f and g .

Table Q1(b)

$g(x)$	$f(x)$	$(f \circ g)(x)$
$x + 1$	$x^2 - 1$	
$\sqrt{x - 1}$	x^2	
	$x - 1$	x^3
$\frac{1}{x}$	$\frac{1}{x^2}$	
$\frac{1}{x}$		$\frac{1}{x^2}$

(10 marks)

(c) Find the inverse function of each of the following if it exists.

i) $f(x) = 2x + 1$

(2 marks)

ii) $g(x) = \frac{x}{x^2 - 1}$

(3 marks)

(d) Given the function $f(x) = 2x + k$ and its inverse $f^{-1}(x) = hkx + \frac{1}{2}$

Find the values of constants h and k

(4 marks)

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Q2 (a) Using the graph in **Diagram Q2(a)**, find the following limits.

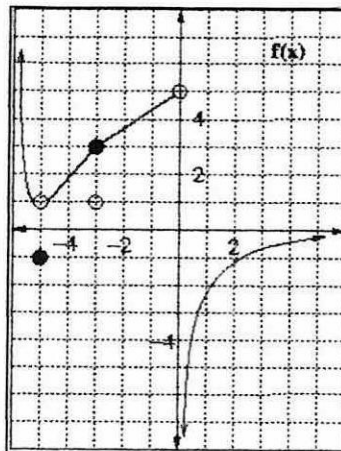


Diagram Q2(a)

- i) $\lim_{x \rightarrow -5} f(x)$. (1 marks)
- ii) $\lim_{x \rightarrow -\infty} f(x)$. (1 marks)
- iii) $\lim_{x \rightarrow 0^-} f(x)$. (1 marks)
- iv) $\lim_{x \rightarrow \infty} f(x)$. (1 marks)

(b) Consider the rational function defined as

$$f(x) = \frac{x^3 - x^2 - 6x}{x^2 - x - 6}$$

- i) What are $f(-2)$ and $f(3)$? (4 marks)
- ii) What are $\lim_{x \rightarrow -2} f(x)$ and $\lim_{x \rightarrow 3} f(x)$? (4 marks)
- iii) Is f continuous at $x=-2$ and $x=3$? Prove your claim. (3 marks)

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- (c) i) Based on the **Figure 2(c)**, find the points at which the function f is continuous and the points at which the function f is discontinuous.

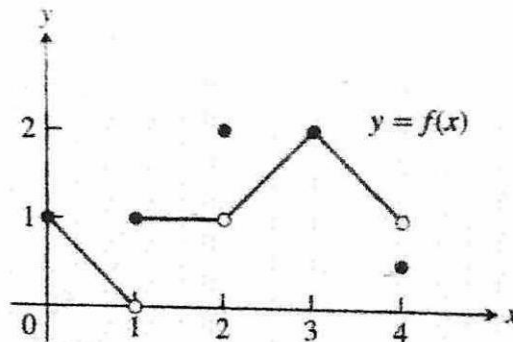


Figure 2(c)

- ii) Determine whether the function f below is continuous at $x=2$ (5 marks)

$$f(x) = \begin{cases} 3, & x = 2 \\ \frac{x^2 + x - 2}{x - 2}, & x \neq 2 \end{cases}$$

(5 marks)

- Q3** (a) Evaluate the derivative of the following functions.

i) $f(x) = (5x^3 + 2)(\sqrt{x} + 1)$

(5 marks)

ii) $f(x) = \frac{2x^2 - 3}{2x + 3}$

(5 marks)

- (b) Determine the turning point(s) of the curve $f(x) = x^3 + x^2 - 8x + 4$. State either the turning point(s) is a maximum or minimum point.

(15 marks)

- Q4** (a) By using the by parts technique of integration, evaluate $\int \ln x(x^{-3}) dx$

(10 marks)

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- (b) The curve $y = x^2 + 4$ is rotated one revolution about the x -axis between the limits $x = 1$ and $x = 4$. Determine the volume of solid of revolution produced.
(15 marks)

- END OF QUESTION -

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