UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2023/2024

COURSE NAME   :   MATHEMATICS II

COURSE CODE   :   BBP 10403

PROGRAMME CODE   :   BBA/ BBB/ BBD/ BBE/BBG

EXAMINATION DATE   :   JULY 2024

DURATION   :   3 HOURS

INSTRUCTIONS   1. ANSWERS ALL QUESTIONS
                         2. THIS FINAL EXAMINATION IS
                            CONDUCTED VIA
                            ☐ Open book
                            ☒ Closed 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 **FOUR (4)** PAGES

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

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

(2 marks)

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

(2 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	
x^3	$\dfrac{1}{3x+1}$	
	x	x^3+1
$\dfrac{1}{x}$	$\dfrac{1}{x^3}$	
$\dfrac{1}{x}$		$\dfrac{1}{x^3}$

(10 marks)

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

i) $f(x) = 4x+1$

(3 marks)

ii) $g(x) = \dfrac{x}{x^4-1}$

(3 marks)

(d) Given the function $f(x) = 3x + k$ and its inverse $f^{-1}(x) = hkx + \dfrac{1}{3}$

Find the values of constants h and k

(5 marks)

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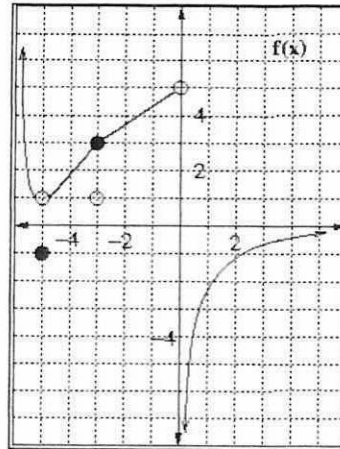Q2 (a) Using the graph in **Diagram Q2(a)**, find the following limits.

Diagram Q2(a)

i) $\lim_{x \to -5} f(x)$.

(2 marks)

ii) $\lim_{x \to -\infty} f(x)$.

(2 marks)

iii) $\lim_{x \to 0^-} f(x)$.

(2 marks)

iv) $\lim_{x \to \infty} f(x)$.

(2 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 $\lim_{x \to -2} f(x)$ and $\lim_{x \to 3} f(x)$?

(6 marks)

iii) Is *f* continuous at *x=-2* and *x=3?* Prove your claim.

(7 marks)

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Q3   (a) Based on the **Figure 2(c)**, find the points at which the function f is
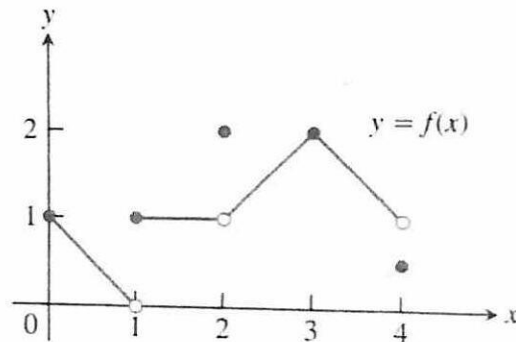continuous and the points at which the function f is discontinuous.

Figure 2(c)

(15 marks)

(b) Determine whether the function f below is continuous at $x=-3$.

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

(10 marks)

Q4   (a) Using the by parts technique of integration, evaluate $\int \ln x (x^4) dx$.

(10 marks)

(b) The curve $f(x) = x^2 - 4$ is rotated one revolution about the x-axis between the
limits $x=0$ and $x=4$. Determine the volume of solid of revolution produced.

(15 marks)

-    **END OF QUESTION**   -

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