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**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER I  
SESSION 2021/2022**

COURSE NAME : MATHEMATICS II  
COURSE CODE : BBP 10403  
PROGRAMME CODE : BBA/ BBB/ BBD/ BBE/BBG  
EXAMINATION DATE : JANUARY/FEBRUARY 2022  
DURATION : 3 HOURS  
INSTRUCTIONS  
1. ANSWERS ALL QUESTIONS.  
2. THIS FINAL EXAMINATION IS AN  
(ONLINE) ASSESSMENT AND  
CONDUCTED VIA (CLOSE BOOK)

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

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**Q1** (a) Sketch the graph of the following function, find the domain and range

i)  $f(x) = 5 - 2x$

(3 marks)

ii)  $f(x) = \sqrt{|x|}$

(3 marks)

(b) Complete the **Table Q1(b)**

**Table Q1(b)**

$g(x)$	$f(x)$	$(f \circ g)(x)$
$x - 7$	$\sqrt{x}$	
$x + 2$	$3x$	
	$\sqrt{x^2 - 5}$	$\sqrt{x^2 - 5}$
$\frac{x}{x-1}$	$\frac{x}{x-1}$	
	$1 + \frac{1}{x}$	$x$

(10 marks)

(c) Find the inverse function of each of the following;

i)  $f(x) = 3x - 8$

(2 marks)

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

(3 marks)

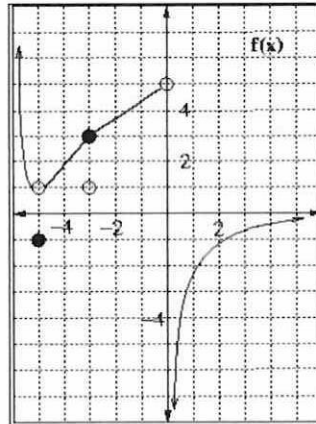
(d) Given the function  $f(x) = 4x + k, f^{-1}(x) = 2hk + \frac{3}{4}$ ,

Find the values of constants  $h$  and  $k$

(4 marks)



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



**Diagram Q2(a)**

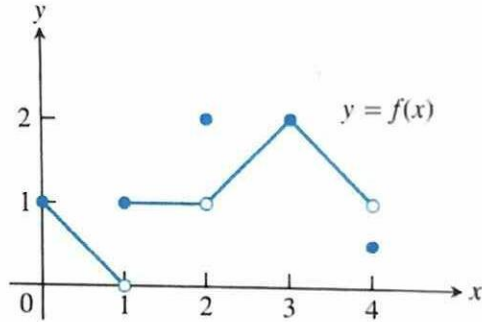
- i)  $\lim_{x \rightarrow -5} f(x)$ . (1 mark)
- ii)  $\lim_{x \rightarrow -\infty} f(x)$ . (1 mark)
- iii)  $\lim_{x \rightarrow 0^-} f(x)$ . (1 mark)
- iv)  $\lim_{x \rightarrow \infty} f(x)$ . (1 mark)

(b) Consider the rational function

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

- i) For what values of  $a$  does  $f$  have a removable discontinuity at  $a$ ? What is  $\lim_{x \rightarrow a} f(x)$  at those  $a$ ? (3 marks)
- ii) For what values of  $a$  does  $f$  have an infinite discontinuity at  $a$ ? (4 marks)
- iii) What is  $\lim_{x \rightarrow +\infty} f(x)$ ? (3 marks)

- (c) i) Based on the **Figure 2(c)** find the points at which the function is continuous the points at which  $f$  is not continuous.



**Figure 2(c)**

- ii) By stated and using the definition of continuity, determine whether the function below is continuous at  $x=2$  (5 marks)

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

(6 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 part by part technique of integration, evaluate  $\int \ln x(x^{-3})dx$

(10 marks)

(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 QUESTIONS -

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