UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(ONLINE)
SEMESTER II
SESSION 2019/2020

COURSE NAME	:	MATHEMATICS II
COURSE CODE	:	BBM 10403
PROGRAMME CODE	:	BBF
EXAMINATION DATE	:	JULY 2020
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

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Q1 (a) It is given that $(x+4)$, $(x-2)$ and $(x-4)$ are the three consecutive terms of a geometric progression.

(i) Find the integer value of x.

(2 marks)

(ii) Hence, calculate the sum to infinity of the progression if $(x-2)$ is its fourth term.

(2 marks)

(b) Based on the limits given:

(i) Find $\lim\limits_{x\to3}\dfrac{x^2-5x+6}{x-3}$. Use L'Hopital Rule to solve it.

(3 marks)

(ii) Find $\lim\limits_{x\to\infty}\dfrac{4x^2-3x+6}{5+2x-3x^2}$. Use L'Hopital Rule to solve it.

(3 marks)

(iii) Solve the equations $\lim\limits_{x\to2}\dfrac{\sqrt{x+7}-3}{x-2}$.

(3 marks)

(c) Solve the following:

(i) Given that $y=x^3\sin x$, find $\dfrac{dy}{dx}$.

(3 marks)

(ii) Find the derivative of the function $f(x)=x^2\sqrt{x^2+1}$.

(3 marks)

(d) Solve the following:

    (i)   Evaluate $\int_{-1}^{3} \pi(3x - 4)^2 \, dx$.

        (2 marks)

    (ii)   Using Figure **Q1(d)**, find the area of the region enclosed by the curve, the y-axis and the lines given.
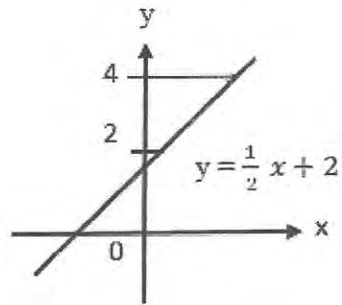

Figure **Q1(d)**

        (4 marks)

Q2 (a) Solve the following:

   (i) If $f(x) = -9x - 9$ and $g(x) = \sqrt{x-9}$, find $(f \circ g)(10)$.

(2 marks)

   (ii) Given $f(x) = x - 1$ and $g(x) = x^2 + 2x - 8$, find $(g \circ f)(x)$.

(2 marks)

(b) The first three terms of an arithmetic progression are $3h,\ k,\ h+2$

   (i) Express k in terms of h.

(2 marks)

   (ii) Find the 10th term of progression in term of h.

(2 marks)

(c) Solve the following:

   (i) Find y' for $x^3 y^5 + 3x = 8y^3 + 1$ using implicit differentiation.

(4 marks)

   (ii) A ball is thrown upward so that its height above the ground after time t is h = 20t - 5t², where h is measured in meters and t is measured in seconds. Determine the equation that represents the velocity of the ball. Then, determine when the ball reaches its maximum height.

(4 marks)

(d) (i) Indefinite integral is an integral expressed without limits, and so containing an arbitrary constant.

   Find $\int \dfrac{10}{(1-10x)^2}\, dx$.

(2 marks)

   (ii) Find $\int_0^3 (3x^2 - 2x)\, dx$ by integration.

(3 marks)

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(iii) Using Figure **Q2(d)**, find the area of the region enclosed by the curve, the y-axis and the lines given.
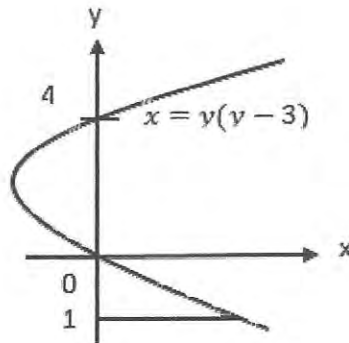

Figure **Q2(d)**

(4 marks)

Q3 (a) Show that each of the following functions are inverses by showing that
$f(g(x)) = x$.

     (i) $f(x) = x^2 - 4$; $g(x) = \sqrt{x + 4}$

                                                                  (2 marks)

     (ii) $f(x) = \dfrac{1}{x-1}$; $g(x) = \dfrac{1}{x} + 1$

                                                                   (2 marks)

     (iii) $f(x) = 2x + 3$; $g(x) = \dfrac{x - 3}{2}$

                                                                   (2 marks)
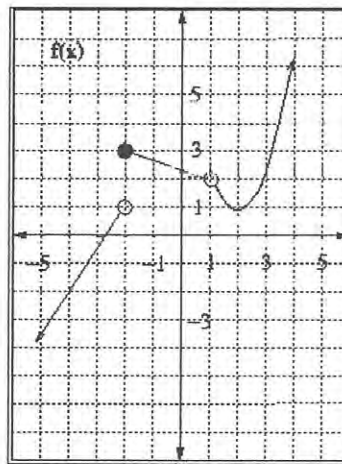
(b) Using the graph in Figure **Q3(b)**, find the following limits.

Figure **Q3(b)**

     (i) $\lim\limits_{x \to 1} f(x)$

                                                                   (2 marks)

     (ii) $\lim\limits_{x \to -2} f(x)$

                                                                      (2 marks)

(c) Solve the following:

(i) Given It is given an arithmetic progression is 5, 7, 9, ….. 87. Find the number of terms of this progression.

(3 marks)

(ii) The sum of the first n terms of a progression is given by $S_n = 3n^2 - 28n$. Find the common difference and the sixth term.

(3 marks)

(d) (i) Evaluate $\int x\,e^x\,dx$ using integration by parts.

(3 marks)

(ii) Find $\int \dfrac{3x-1}{x^2-x-6}\,dx$ using integration by partial fractions.

(3 marks)

(iii) Using substitution method, evaluate $f(x) = (x^2+1)^3$.

(3 marks)

- **END OF QUESTION** -

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