THE UNIVERSITY OF THE WEST INDIES
FIVE ISLANDS CAMPUS

Summer/Semester III

Examinations of Summer 2020/2021

Course Code:	**ECON1003**
Course Title:	**Mathematics for Social Science 1**
Date of Assessment:	**Monday July 26, 2021**
Time:	**9:00am**
Duration:	**2 Hours**

INSTRUCTIONS TO CANDIDATES:

THIS PAPER HAS THREE (3) PAGES AND FOUR (4) QUESTIONS.

STUDENTS ARE REQUIRED TO ANSWER ALL QUESTIONS.

1. Given that $f(x) = \frac{x+1}{x-3}$, $and\ g(x) = x^2 - 3x$; Evaluate

   a. i. $g(p-3)$ **[3 marks]**

   ii. $f^{-1}(x)$ **[5 marks]**

   iii. $fg(-2)$ **[5 marks]**

   b. Determine if $f(x) = \frac{x+1}{x-3}$ is a bijective function. **[6 marks]**

   c. Consider the following sequence

   $$-1, 2.5, 6, 9.5 \ldots \ldots \ldots$$

   i. Determine the common difference of the A.P. **[1 mark]**

   ii. Determine the general or nth term of the series **[3 marks]**

   iii. Determine the 20^{th} term of the sequence **[2 marks]**

   iv. Determine the sum the first 20 terms of the sequence. **[3 marks]**

2. a. Evaluate $\lim_{x \to -6} \frac{36-x^2}{6+x}$ **[3 marks]**

   b. The function $f(x) = \begin{cases} 3x - 5\ , if\ x < 2 \\ 5 - 2x, if\ x \geq 2 \end{cases}$

   Evaluate

   i. $f(2)$ **[2 marks]**

   ii. $\lim_{x \to 2^-} f(x)$ **[2 marks]**

   iii. $\lim_{x \to 2^+} f(x)$ **[2 marks]**

   iv. Comment on the continuity of the function at the point $x = 2$. **[1 mark]**

   c. The Matrix $P = \begin{pmatrix} x-2 & 2x \\ -5 & x \end{pmatrix}$ is a singular matrix. Determine the value(s) of x.

   [5 marks]

   d. A farmer has 75 acres of land to cultivate. He decides to cultivate 3 crops, tomatoes, green peppers and pumpkins. It cost \$12 per acre to cultivate tomatoes, \$8 per acres to cultivate green peppers and \$5 per acre to cultivate pumpkin. The farmer has a budget of\$ 755.00. Tomato is a very important crop and as such the farmer wishes for the land allocated to tomato cultivation to be twice the amount allocated for both green pepper and pumpkin cultivation. Determine the amount of land that should be allocated to each crop.

   [10 marks]

3. a. Determine the derivative of the following functions

c. In a certain firm, the cost and revenue functions for an item x are given by

Cost function: $C(x) = 8000 + 20x$
Revenue function: $R(x) = 200x - 0.4x^2$

Find:

(i) The profit function $P(x)$ in terms of x. **[2 marks]**
(ii) The marginal profit function for the firm **[2 marks]**
(ii) The level of demand x which maximizes the firm's profit **[3 marks]**
(iii) The firm's maximum profit. **[2 marks]**
(iv) Verify that the level of demand obtained at (iii) is in fact representing a maximum. **[2 marks]**

4. a. Evaluate the following

i. $\int 5x^4 - 3x^2 + \frac{1}{x^2} dx$ **[4 marks]**

ii. $\int_0^1 (3x^2 - 1)^2 dx$ **[5 marks]**

b. The marginal cost function MC of a firm is given by $MC = 50x + 27x^2$. Find the total cost function (TC) given that TC=\$37000.00 when x=15. **[5 marks]**

END OF EXAMINATION