THE COUNCIL OF COMMUNITY COLLEGES OF JAMAICA

ASSOCIATE OF SCIENCE EXAMINATION

SEMESTER I – 2009 DECEMBER

PROGRAMME:	**BUSINESS STUDIES** **COMPUTER APPLICATION IN BUSINESS STUDIES** **COMPUTER SERVICING AND ELECTRONICS**
COURSE NAME:	**CALCULUS**
CODE:	**(MATH2301)**
YEAR GROUP:	**TWO**
DATE:	**WEDNESDAY, DECEMBER 9, 2009**
TIME:	**1:00 – 4:00 PM**
DURATION:	**3 HOURS**
EXAMINATION TYPE:	**FINAL**

INSTRUCTIONS:

SECTION B: ANSWER ANY <u>TWO (2)</u> QUESTIONS FROM THIS SECTION.

SECTION B

Instructions: Answer any <u>two (2)</u> questions from this section.

Question 1

a. Differentiate the following functions:

i. $f(x) = -8x^5 + \sqrt{x^3} + 2x^2 - 12$ ***(4 marks)***

ii. $f(x) = (5x^3 - 20x)(4x + 3)$ ***(5 marks)***

iii. $G(x) = \dfrac{3x-2}{x^2+7}$ ***(6 marks)***

d. Find the indicated partial derivatives

i. $f(x, y) = x^2y^3 - 2x^4y$, $f_{xx}(2, 3)$ ***(5 marks)***

ii. $f(x, y, z) = x^5 + x^4y^4z^3 + yz^2$, $f_{xy}(-1, 1, 3)$ ***(5 marks)***

(Total 25 marks)

Question 2

a. Evaluate $\int \dfrac{3x^2 - 2x + 1}{\sqrt{x}}\,dx$ ***(5 marks)***

b. $\int (x^2 - 1)\sqrt{x}\,dx$ ***(5 marks)***

c. $\int (3x - 5)^{12}\,dx$ ***(3 marks)***

d. $\int_1^{16} x^{\frac{3}{2}}\,dx$ ***(5 marks)***

e. $\int_0^1 \int_0^1 (1 - 2x^2 - y^2)\,dy\,dx$ ***(7 marks)***

(Total 25 marks)

Question 3

a. Find the relative extreme of $f(x, y) = x^4 + y^3 - 32x - 27y - 1$ ***(5 marks)***

b. Using the first principles, find the derivative of $f(x) = 3x^2 + 2$ ***(5 marks)***

c. Find $\lim_{x \to +\infty} \frac{2x+5}{x^2-7x+3}$ ***(5 marks)***

d. Find $\lim_{x \to 2} \left(\frac{1}{x-2} - x^{\frac{4}{2}} - 4 \right)$ ***(5 marks)***

e. Given the function $f(x) = \frac{x^2-2x-3}{x^2+2x-15}$ determine all the values of x for which $f(x)$ is discontinuous. ***(5 marks)***

(Total 25 marks)

Question 4

A data processing company employs both senior and junior programmers. A large project will cost $C(x,y) = 2000+2x^3-12xy+y^2$ dollars where x and y represent the number of junior and senior programmers used respectively.

a. How many employees of each kind should be assigned to the project in order to minimize cost? ***(13 marks)***

b. What is the minimum cost? ***(3 marks)***

c. i. Differentiate implicit $2y+xy-4x^2=0$. ***(4 marks)***

ii Determine the gradient of this function when x = 1. ***(5 marks)***

(Total 25 marks)

END OF EXAMINATION