THE COUNCIL OF COMMUNITY COLLEGES OF JAMAICA

ASSOCIATE DEGREE EXAMINATIONS

SUMMER/ SUPPLEMENTAL – 2009

PROGRAMME:	**BUSINESS STUDIES** **COMPUTER APPLICATIONS IN BUSINESS STUDIES**
COURSE NAME:	**CALCULUS**
CODE:	**(MATH2301)**
YEAR GROUP:	**TWO**
DATE:	**FRIDAY, AUGUST 21, 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. Evaluate the following limits:

i. $\lim_{x\to 3}\dfrac{9-x^2}{x-3}$ ***(4 marks)***

ii. $\lim_{x\to\infty}\dfrac{9x^3-5x^2+6x-8}{4x^3+10x^2-3x+4}$ ***(5 marks)***

iii. $\lim_{x\to 5}\dfrac{x-5}{x^2-3x-10}$ ***(4 marks)***

b. State the conditions for a function f(x) to be continuous at the point x = c ***(3 marks)***

c. Given a function f: R $\to$ R defined by $f(x)=\begin{cases}-100x+600 & if\ \ 0\le x<5\\ -100x+1100 & if\ \ 5\le x<10\\ -100x+1600 & if\ 10\le x<15\end{cases}$

Determine if f(x) is continuous at x = 10 ***(5 marks)***

d. Determine the values of x for which f(x) = $\dfrac{2x+1}{(x-1)(x+2)}$ is discontinuous ***(4 marks)***

(Total 25 marks)

Question 2

a. Find the first derivative with respect to *x,* of the following functions using first Principle:

i. $f(x)=6+5x-x^2$ ***(5 marks)***

ii. $f(x)=\sqrt{x+2}$ ***(7 marks)***

b. Find the first derivative with respect to x of the following functions:

i. $f(x) = (2x+5)(x^2-3)^4$ ***(4 marks)***

ii. $f(x) = \dfrac{x^2-4}{x+1}$ ***(3 marks)***

c. Given the function $y = \dfrac{4x^3+x}{2x^3-2}$, find the equation of the:

i. value(s) of x is the function y discontinuous ***(3 marks)***

ii. function y as x gets larger and larger ***(3 marks)***

(Total 25 marks)

Question 3

a. Differentiate the following functions by rule with respect to x: $y = x^{x+3}$ ***(6 marks)***

b. Determine the second derivative of the function: $y = e^{3-x^3}$ ***(5 marks)***

c. Given the function $f(x) = 2x^3 + 3x^2 - 12x + 4$, find:

i. critical points (identify each critical value as either relative maximum or relative minimum) ***(12 marks)***

ii. point of inflection ***(2 marks)***

(Total 25 marks)

Question 4

a. Integrate the following:

i. $\int \dfrac{2}{x} dx =$ ***(4 marks)***

ii. $\int 6xe^{x^2} dx =$ ***(4 marks)***

b. Evaluate the following expression $\int_{-2}^{3} 5 + 4x - 2x^3 dx$ ***(7 marks)***

c. The marginal cost function for 'Biz Tech Ltd' (a perfectly competitive firm) is: $C'(q) = 0.6q^2 - 12q + 250$. If Biz Tech Ltd fixed cost is \$360 and its average price is \$325 determine the:

i. cost function of Biz Tech ***(3 marks)***

ii. profit function of Biz Tech ***(2 marks)***

iii. maximum profit that can be made by Biz Tech ***(5 marks)***

(Total 25 marks)

END OF EXAMINATION