OLABISI ONABANJO UNIVERSITY, AGO-IWOYE
CENTRE FOR SANDWICH PROGRAMME (CESAP)
FACULTY OF SOCIAL AND MANAGEMENT SCIENCES
ECONOMICS DEPARTMENT
2009/2010 HARMATTAN SEMESTER EXAMINATION
COURSE CODE/TITLE: EC0 303/MATHEMATICS FOR ECONOMISTS II
TIME ALLOWED: $1^1/_2$ HOURS
Instruction: Attempt any **THREE** Questions

1(a) Find the limit of the functions

(i) $\lim_{x \to \infty} \dfrac{2x^3 - 5x + 4}{3x^2 + 2x^2 - 10}$

(ii) $\lim_{x \to 0} \dfrac{\tan x - \sin x}{x^2 \tan x}$

(b). Find $^{dy}/_{dx}$ for (i) $x^2 e^x \log x$

(ii) $x^y = e^{x-y}$

(c) Specify the order and degree of the following differential equations.

(i) $\left[\dfrac{d^3y}{dx^3}\right]^3 + yx^2 \left[\dfrac{d^4y}{dx^4}\right] = 4y^4$

(ii) $\left[\dfrac{dy}{dt}\right]^4 - 5t^3 = 2$

2(a) Determine if $y = \dfrac{x^2 - 4}{x - 2}$ is continuous at $x = 2$

(b). Verify Euler's theorem for the function $Z = (x^2 + xy + y^2)^{-1}$

(c) Given the following pair of function:

$x = f(u, v)$

$y = g(u, v)$

Use the functions to state the Jacobian determinant, hence specify the condition to test for existence of functional dependence.

3(a). Evaluate $\int_0^2 x^3 (25 - x^4)^{1/2} dx$

(b) Given the demand and supply functions $D(x) = 20 - \dfrac{1}{20}x$ and $S(x) = 2 + \dfrac{1}{5000}x^2$ respectively. Determine the consumer surplus.

4(a) If $\begin{pmatrix} 5 & -4 & x & 0 \\ 3 & y & 1 & 5 \end{pmatrix} = \begin{pmatrix} t & -4 & 3 & 0 \\ 3 & 0 & 1 & v \end{pmatrix}$

Find the values of x, y, t, v.

(b) Consider a monopolistic firm producing three related goods when demand functions and cost function are:

$p_1 = 180 - 3q_1 - q_2 - 2q_3$

$p_2 = 200 - q_1 - 4q_2$

$p_3 = 150 - q_2 - 3q_3$

$TC = q_1^2 + q_1q_2 + q_2^2 + q_2q_3 + q_3^2$

(i) Use the technique of Cramer's rule to determine the optimum q_1, q_2, & q_3

(ii) Use the technique of Hessian determinant to verify optimization