INTI INTERNATIONAL UNIVERSITY

FOUNDATION IN SCIENCE (CFSI)
MAT1211: MATHEMATICS 2
FINAL EXAMINATION: AUGUST 2015 SESSION

Instructions: This paper consists of **FIVE (5)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

(a) Solve the following system of linear equations by using Cramer's rule

$$\begin{aligned} x + y + z &= 4 \\ 2x - 3y + 4z &= 33 \\ 3x - 2y - 2z &= 2 \end{aligned}.$$

(7 marks)

(b) Use the method of inverse matrix to solve the system of linear equations:

$$2x + 5y = 26 \text{ and } 2x + y = 10.$$

(4 marks)

(c) If $Z_1 = 1 - 3j, Z_2 = -2 + 5j$ and $Z_3 = -3 - 4j,$ express your answers in the form of $a + jb$

(i) $Z_1 Z_2$

(2 marks)

(ii) $\dfrac{Z_1}{Z_3}$

(3 marks)

(iii) $(Z_1)^3$

(4 marks)

(iv) $(Z_3)^{\frac{1}{2}}$

(5 marks)

Question 2

(a) A group of students go to interview stewardess job in aircraft Malaysia and the height are measured correct to the nearest centimeter with the results below.

(i) Copy and complete the table below. (6 marks)

Height	Number of students f	Mid-point x	fx	fx^2
150 – 157	5			
158 – 165	18			
166 – 173	42			
174 – 181	27			
182 – 189	8			
	$\sum f =$		$\sum fx =$	$\sum fx^2 =$

(ii) Find the mean of the data.

(2 marks)

(iii) Find the median of the data using formula.

(3 marks)

(iv) Find the mode of the data using formula.

(3 marks)

(v) Find the variance of the data using formula.

(3 marks)

(b) Given that $A(3,1,2), B(4,3,1)$ and $C(1,3,4)$. Determine a unit vector perpendicular to the plane that passes through the points A, B, C.

(8 marks)

Question 3

(a) Evaluate $\int_{0.1}^{0.7} \frac{1}{\sqrt{(1-x^2)}} dx$ using trapezoidal rule and Simpson's rule. Use 6 intervals and gives answer correct to 3 decimal places by copy and complete the table X given.

Table X

n	x_n	$f(x_n)$
0		
1		
2		
3		
4		
5		
6		

(8 marks)

(b) Find the first two non-zero terms of the Maclaurin's series for $\mathrm{f}(x) = \ln\cos x$.

(7 marks)

(c) Find the first three non-zero terms of the Tsylor's series for $\mathrm{f}(x) = \frac{1}{x^2}$ at the point $x = 1$.

(5 marks)

(d) Solve the equation $\frac{dy}{dx} = 1 + xy$ using the Euler Method for $x = 0(0.1)(0.5)$, given that $x = 0, y = 1$. Use 5 intervals and gives answer correct to 4 decimal places by copy and complete the table Y given.

Table Y

n	x_n	(y_n)
0		
1		
2		
3		
4		
5		

(5 marks)

Question 4

(a) A drinking can cylinder has dimensions r = 5cm, h = 10cm. Find the approximate increase in volume when r increases by 0.2cm and h decreases by 0.1cm.

(6 marks)

(b) The power dissipated in a resistor is given by $P = \frac{E^2}{R}$. If $E = 200$ volts and $R = 8$ ohms, find the change in P resulting from a drop of 5 volts in E and an increase of 0.2 ohm in R.

(5 marks)

(c) Given $z = 4x^2y^3 - 2x^3 + 7y^2$ find $\frac{\partial z}{\partial y}, \frac{\partial z}{\partial x}, \frac{\partial^2 z}{\partial x^2}, \frac{\partial^2 z}{\partial y^2}, \frac{\partial^2 z}{\partial x \partial y}, \frac{\partial^2 z}{\partial y \partial x}$.

(10 marks)

(d) Find the angle between $\overline{A} = i - 2j - 3k$ and $\overline{B} = 4i + 5j + 6k$.

(4 marks)

Question 5

(a) Find the particular solution of the differential equation $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} = -12\sin x$ when $\frac{dy}{dx} = 5, x = 0$ and $y = 01.8$

(19 marks)

(b) Find the general solution of the differential equation $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 4y = 0.$

(4 marks)

(c) Solve the first order differentiation equation: $2y\tan x\frac{dy}{dx} = (4 + y^2)\sec^2 x.$

(5 marks)

--THE END--