



**INTI**  
International College Penang

**FINAL**  
Examination Paper

(COVER PAGE)

Session : January 2020

Programme : Foundation in Business Information Technology (CFPI)

Course : **MAT1215: Fundamentals of Mathematics**

Date of Examination : 7 April 2020 (Tuesday)

Time : 9:00am – 11:00am

Duration : 2 Hours Reading Time : Nil

Special Instructions :

This paper consists of **FIVE (5)** questions. Answer **ALL FIVE (5)** questions.

All questions carry equal marks. Show complete workings.

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**IMPORTANT NOTE : THIS PAPER SHOULD NOT BE TAKEN OUT OF THE EXAMINATION HALL**

Materials Permitted :  
Non-Programmable Calculator

Materials Provided :  
Formula Booklet

Examiner(s) : Mr. Goh Chok Huat

Moderator : Dr. Ch'ng Pei Eng

*This paper consists of 5 printed pages, including the cover page.*

## INTI INTERNATIONAL COLLEGE PENANG

FOUNDATION IN BUSINESS INFORMATION TECHNOLOGY (CFPI)  
MAT1215 : FUNDAMENTALS OF MATHEMATICS  
FINAL EXAMINATION: JANUARY 2020 SESSION

**Instructions:** This paper consists of **FIVE (5)** questions. Answer **ALL FIVE (5)** questions. All questions carry equal marks. Show complete workings.

**Question 1**

(a) Simplify each expression:

(i)  $(5 + 8x^2 - 2x^3 + 3x^4) - (2x^4 - 3x^3 + x^2 + 23)$  (2 marks)

(ii)  $3\sqrt{27} - 7\sqrt{3} + \sqrt{12}$  (3 marks)

(b) Factorize each expression completely:

(i)  $4x^2 - 144$  (3 marks)

(ii)  $3x^2 + 5x - 12$  (2 marks)

(c) Rationalize the denominator of  $\frac{\sqrt{3}+1}{\sqrt{3}-1}$ . (4 marks)

(d) Simplify  $\left(\frac{6x^3y^{-2}}{2xy^2}\right)^2$  and express your answer in positive exponents only. (4 marks)

(e) Convert  $5.127 \times 10^{-3}$  to decimal notation. (1 mark)

(f) Write 44,385,000 in scientific notation. (1 mark)

**Question 2**

- (a) The revenue and cost functions for a company manufacturing graphing calculators were determined to be:

$$R(x) = 75x \text{ and } C(x) = 35x + 50000$$

Where  $x$  represents the number of units sold.

- (i) Find the profit function. (2 marks)
- (ii) How many graphing calculators must be sold in order for the company to breakeven? (3 marks)
- (iii) What is the profit if 10,000 graphing calculators are sold? (1 mark)
- (b) Differentiate the following functions with respect to  $x$ :
- (i)  $y = 3x^4 - 2x^2 + x + 5$  (2 marks)
- (ii)  $y = \frac{2}{3x+1}$  (3 marks)
- (c) Determine the following:
- (i)  $\int (x^3 - x + 1) dx$  (2 marks)
- (ii)  $\int_1^2 \left(x - \frac{1}{x}\right)^2 dx$  (4 marks)
- (d) Find the equation of the line passing through the point (2, 1) and parallel to the line  $AB$ , where  $A$  is the point (2, 5) and  $B$  is the point (3, -3). (3 marks)

**Question 3**

- (a) Solve the following linear programming problem graphically:

Minimise:  $1000x + 800y$

Subject to:  $16x + 12y \geq 96$   
 $20x + 20y \geq 140$   
 $x \geq 0, y \geq 0$

(8 marks)

- (b) Given  $f(x) = x^2 - 8x + 15$

(i) Find the vertex of  $f(x)$ .

(2 marks)

(ii) Find the  $x$  and  $y$  intercepts. Hence sketch the graph of  $f(x)$ .

(5 marks)

(iii) Find the area enclosed by the graph  $f(x)$ , the  $x$ -axis and the lines  $x = 0$  and  $x = 3$ .

(5 marks)

**Question 4**

- (a) Given the first four terms of a geometric sequence: 3, -6, 12, -24,...

(i) Find the 15<sup>th</sup> term of the sequence.

(2 marks)

(ii) Find the sum of the first 15 terms of the sequence.

(3 marks)

- (b) An arithmetic sequence has the 3<sup>rd</sup> term 27 and the 8<sup>th</sup> term 47. Find the 20<sup>th</sup> term.

(5 marks)

- (c) If a single sum of RM2500 is invested at 9% per annum compounded monthly, what is the amount after 10 years?

(4 marks)

- (d) A committee of 5 people is to be formed from a group of 5 females and 4 males. How many committees can be formed if
- (i) gender is not an issue? (2 marks)
  - (ii) the number of males must be more than females? (4 marks)

**Question 5**

(a) Given the matrices  $A = \begin{bmatrix} -1 & 3 \\ 1 & -2 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & 1 \\ 4 & 3 \end{bmatrix}$ , find

- (i)  $2A + 3B$ . (2 marks)
  - (ii)  $3AB - A$ . (4 marks)
  - (iii)  $(B^{-1})^T$ . (4 marks)
- (b) Solve the following system of equations using Cramer's rule:

$$\begin{aligned} 3x + 2y &= 6 \\ 5x + 3y &= 11 \end{aligned}$$

(5 marks)

(c) A total of 50 households were asked whether they have Microwave Oven ( $M$ ) and Coffee Maker ( $C$ ) at home, and the information obtained is given below:

$$n(M \cap C) = 15, \quad n(M) = 25, \quad n(C) = 33$$

- (i) Represent the information in a Venn Diagram. (3 marks)
- (ii) Find the number of households that has Coffee Maker but not Microwave Oven. (1 mark)
- (iii) Find the number of households that has neither Coffee Maker nor Microwave Oven. (1 mark)