



INTI International College Penang

FINAL
Examination Paper
(COVER PAGE)

Session : April 2019

Programme : Foundation in Business Information Technology (CFPI)

Course : MAT1215 : Fundamentals of Mathematics

Date of Examination : 25 July 2019 (Thursday)

Time : 11:00AM – 1:00PM Reading Time : Nil

Duration : 2 hours

Special Instructions :

This paper consists of **SIX (6)** questions. Answer any **FIVE (5)** questions in the answer booklet provided. All questions carry equal marks.

Materials permitted :

Non-Programmable Calculator

Materials provided :

Formula Booklet 1 & Graph Paper

Examiner(s) :

Bark Chee Beng

Moderator :

Dr. Ch'ng Pei Eng

This paper consists of 6 printed pages, including the cover page.

INTI INTERNATIONAL COLLEGE PENANG
 FOUNDATION IN BUSINESS INFORMATION TECHNOLOGY (CFPI)
 MAT1215 : FUNDAMENTALS OF MATHEMATICS
 FINAL EXAMINATION: APRIL 2019 SESSION

Instructions:

This paper consists of **SIX (6)** questions. Answer any **FIVE (5)** questions in the answer booklet provided. All questions carry equal marks. Show complete workings.

Question 1

(a) Simplify each expression by removing parenthesis:

(i) $(x^5 - 2x^3 + 3x^2 + 5) - (-2x^4 + 4x^3 - x^2 + 1)$ (2 marks)

(ii) $2s^5t^2(5s^2t - \frac{t}{s})$ (2 marks)

(b) Factorize each expression completely:

(i) $4x^2 - 100$ (2 marks)

(ii) $3x^3 - 192$ (3 marks)

(c) Rationalize the denominator of $\frac{2 - \sqrt{3}}{3 + \sqrt{2}}$. (4 marks)

(d) Simplify $\left(\frac{3x^4y^{-1}z^{-2}}{2x^{-3}y^2z^{-1}}\right)^{-3}$ and express your answer in positive exponents only. (5 marks)

(e) (i) Convert 4.482×10^{-6} to decimal notation. (1 mark)

(ii) Write 333,000 in scientific notation. (1 mark)

Question 2

- (a) Given points A(-2, 7) and B(3, -3).
- (i) Find the slope of line AB. (1 mark)
- (ii) Find the equation of the line AB. (2 marks)
- (iii) Find the equation of the line that passing through (2, 2) and normal to line AB. (4 marks)
- (b) Differentiate the following functions with respect to x :
- (i) $y = 6x^4 + 5x^2 + 3x + 3$ (2 marks)
- (ii) $y = \frac{2}{3x+3}$ (3 marks)
- (c) Integrate the following functions with respect to x :
- (i) $\int (x^2 - 3x + 4 + \frac{3}{x^2}) dx$ (3 marks)
- (ii) $\int_1^3 (3x+2)^2 dx$ (5 marks)

Question 3

- (a) A trading company buys and sells computer accessories . It costs RM8 to buy a specified accessory, and then to sell at RM15. The cost of handling the whole trading of the accessory is RM6,006 per month. Let x be the number of the accessories bought and sold in a month.
- (i) Write the cost function, $C(x)$, for the month. (1 mark)
- (ii) Write the revenue function, $R(x)$, for the month. (1 mark)
- (iii) Determine the quantity of accessories needed to be bought and sold in order to break even. (2 marks)

- (iv) Write the profit function, $P(x)$. (2 marks)
- (v) Use the profit function to calculate the profit if 1,300 accessories were bought and sold. (1 mark)
- (b) Given $f(x) = x^2 + 4x - 32$.
- (i) Find the vertex of $f(x)$. (2 marks)
- (ii) Find the x and y intercepts. Hence, sketch the graph of $f(x)$. (6 marks)
- (iii) Find the area under the graph $f(x)$ from $x = 4$ to $x = 8$, and the x -axis. (5 marks)

Question 4

- (a) An arithmetic sequence has a 1st term of 9 and whose common difference is 4. Find
- (i) the 25th term, (2 marks)
- (ii) the sum from 15th term to 20th term of the arithmetic series. (5 marks)
- (b) The sum of the first n terms of the geometric progression 8, 16, 32, 64 ... is 8184. Find the value of n . (5 marks)
- (c) Solve the following linear programming problem graphically :
- Maximize : $2x + 6y$
- Subject to :
- $$3x + 4y \leq 24$$
- $$x + y \geq 6$$
- $$x \geq 0, y \geq 0$$
- x, y are positive integers
- (i) Plot the graph. Label clearly the respective lines, and shade the possible solutions region. (5 marks)
- (ii) Show working on evaluation for maximizing $2x + 6y$. (3 marks)

Question 5

(a) Suppose $A = \begin{bmatrix} -1 & 1 \\ 3 & 2 \end{bmatrix}$, and $B = \begin{bmatrix} 0 & -2 \\ -1 & 2 \end{bmatrix}$.

Perform the indicated operations below :

(i) $3A - B$ (2 marks)

(ii) $A^{-1}B$ (4 marks)

(b) Determine the value of u if $M = \begin{bmatrix} u-1 & 2u-1 \\ 2 & 3 \end{bmatrix}$ has no inverse.

(3 marks)

(c) Perform the following matrix operation :

$$\begin{bmatrix} 1 & 2 \\ 3 & -4 \end{bmatrix} \begin{bmatrix} 0 & -2 \\ 1 & 4 \end{bmatrix} \begin{bmatrix} 2 \\ 1 \end{bmatrix}$$

(3 marks)

(d) The system of equations below can be written as $AX = B$.

$$2x - y = 3$$

$$3x + 2y = 8$$

(i) List the matrices A , X and B . (3 marks)

(ii) Find A^{-1} . (3 marks)

(iii) Solve for X . (2 marks)

Question 6

- (a) Mary invested a lump sum RM10,000 in an investment plan. At the end of the 5 years period, she received the total amount RM12,000. At what rate per year on average is the investment return (assuming the rate is compounded yearly over the 5 years)? (Leave your answer in one decimal place and in percentage form.) (5 marks)
- (b) A team of five players is to be chosen to represent the school in a chess game competition. These five players are to be chosen from the school chess club's top 10 players, of which consists of four males and six females. Determine how many ways a team of five can be formed if
- (i) there is no restriction, (2 marks)
- (ii) the team shall consist of exactly two males, (2 marks)
- (iii) the team shall consist of at least 3 males. (4 marks)
- (c) All the 35 students in a class were asked if they take part in two main extra-curricular sports, Football(F) and Badminton(B), and the information are obtained as follow :
- $n(F \cap B) = 12$
 $n(F) = 18$
 $n(B) = 20$
- (i) Find the number of students that take part ONLY in Football. (2 marks)
- (ii) Find the number of students that did not take part in Badminton. (2 marks)
- (iii) Find the number of students that neither take part in Football nor Badminton. (2 marks)
- (iv) Represent the information in the Venn Diagram. (1 mark)