



THE COUNCIL OF COMMUNITY COLLEGES OF JAMAICA

FINAL ASSESSMENT

SEMESTER II – 2022 MAY

PROGRAMME: BUSINESS ADMINISTRATION
COURSE NAME: OPERATIONS RESEARCH
CODE: MATH3602
YEAR GROUP: THREE
DATE: THURSDAY, 2022 JUNE 02
TIME: 9:00 A.M. - 12:00 NOON
DURATION: 3 HOURS

This paper has 3 pages

INSTRUCTIONS:

- 1. ANSWER ALL QUESTIONS**
- 2. ATTACH THE SIGNED CCCJ ASSIGNMENT COVER SHEET TO THE FRONT OF YOUR ASSIGNMENT BEFORE YOU SUBMIT**

NOTE: YOUR ASSIGNMENT WILL NOT BE ACCEPTED IF YOU DO NOT COMPLY WITH 2. ABOVE

YOUR COMPLETED WORK MUST BE SUBMITTED WITHIN THE SPECIFIED DURATION OUTLINED ABOVE TO PREVENT PENALTIES

SECTION B

Instruction: Complete ALL questions.

Question 1

- A. Sweet Stuff is a small candy manufacturing company that produces two types of chocolate, x and y. Both require milk and cacao only, as follows:

- i. A unit of x requires 1 unit of milk and 3 units of cacao
- ii. A unit of y requires 1 unit of milk and 2 units of cacao

The company kitchen has a total of 5 units of milk and 12 units of cacao. On each sale, the company makes a profit of:

- i. \$6 per unit of x sold
- ii. \$5 per unit of y sold

Sweet Stuff wishes to maximise profit. Use a linear programming method to determine how many units of x and y should be produced as well as the maximum profit to be earned at that level of production. **(10 marks)**

- B. Hammonds Corporation is trying to decide between two order plans for its inventory of a certain item. Irrespective of the plan, demand for the item is expected to be 1 000 units annually. Under plan A, order costs would be \$40 per order and inventory holding costs (carrying cost) would be \$100 per unit per annum. Under plan B, order costs would be \$30 per order while holding costs would be 20% of the unit cost which is \$480.

Determine:

- i. the economic order quantity for each plan. **(5 marks)**
- ii. total inventory cost for each plan. **(4 marks)**
- iii. which plan would be better for Hammonds. **(1 mark)**

(Total 20 marks)

Question 2

A. Given the matrix $R = \begin{pmatrix} 2 & -1 \\ 1 & 3 \end{pmatrix}$,

- i. show that R is non-singular. (1 mark)
- ii. find R^{-1} , the inverse of R. (2 marks)
- iii. show that $RR^{-1} = I$. (2 marks)

B. Use the matrix method or otherwise to solve the following system of simultaneous equations:

- i. $x + 2y + 3z = -5$
- ii. $3x + y - 3z = 4$
- iii. $-3x + 4y + 7z = -7$ (15 marks)

(Total 20 marks)

Question 3

Mr Martin can drive to work along four different routes. The following are the number of minutes the journey takes on five different occasions for each route:

Route 1	Route 2	Route 3	Route 4
22	25	26	26
26	27	29	28
25	28	33	27
25	26	30	30
31	29	33	30

Copy and complete the following ANOVA Table and test if all routes are equally fast.
Test using $\alpha = .05$

Source	DF	SS	MS	F
Group				
Error				
Total				

(20 marks)

END OF ASSESSMENT