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Module Detail		Trainee's Detail		
SECTOR:	ICT	**Reg No:**		
SUB-SECTOR:	Information Technology	**Class:**	Level 6 Information Technology	
		Trainer's Detail		
CERTIFICATE:	TVET Diploma	**Name:**	HAKIZIMANA Thacien	
MODULE (Code &Title):	GENFM601: Fundamental Engineering Mathematics	**Additional info**		
Competence:	Apply fundamental Engineering Mathematics	**Duration:**		
		Date:	13th March, 2022	
Training Centre:	IPRC Ngoma	**Signature:**		
Scored marks:	45	**Decision:**	**Competent**	
			Not Yet Competent	

Assignment Unit 5

L.O.5.1. Correctly illustrate matrices operations based on matrix size
L.O.5.2. Determine correctly inverse of matrices based on matrix determinant
L.O.5.3. Correctly apply matrices for solving real life problems based on matrix operations.

Instructions: Attempt all questions in groups

Group Members No:

#	Names	Student Reg No	Signature
1			
2			
3			
4			
5			
6			

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Question 1 Consider two matrices $A = \begin{bmatrix} 3 & 1 & 7 \\ 2 & 3 & 5 \\ 5 & 6 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 56 & 67 & 78 \\ 49 & 59 & 69 \\ 36 & 48 & 60 \end{bmatrix}$

Find the matrix X given that $AX = B$.

Question 2

Solve the following systems of equations by matrix inversion method

$$\begin{cases} \frac{2}{x} + \frac{3}{z} - \frac{3}{y} = 10 \\ \frac{1}{x} + \frac{1}{z} + \frac{1}{y} = 10 \\ \frac{3}{x} + \frac{1}{y} + \frac{2}{z} = 13 \end{cases}$$

Question 3

Calculate this detrminant and give the more simplified answer

$$\begin{vmatrix} \sin x - \cos x & \sin x + \cos x & 1 \\ -\cos x & \sin x & \frac{1}{2} \\ \cos x + \sin x & \cos x - \sin x & -\frac{1}{2} \end{vmatrix}$$

Question 4

Using the properties of determinant, show that:

$$\begin{vmatrix} \boldsymbol{a} & \boldsymbol{b} & \boldsymbol{c} \\ \boldsymbol{a^2} & \boldsymbol{b^2} & \boldsymbol{c^2} \\ \boldsymbol{b+c} & \boldsymbol{c+a} & \boldsymbol{a+b} \end{vmatrix} = (\boldsymbol{a-b})(\boldsymbol{b-c})(\boldsymbol{c-a})(\boldsymbol{a+b+c})$$

Question 5

a) Find x if the matrix $A = \begin{bmatrix} x-2 & 1 \\ 5 & x+2 \end{bmatrix}$ is singular.

b) Solve for x and y $\begin{bmatrix} x & 2y \\ 3 & 4 \end{bmatrix}\begin{bmatrix} 1 & -2 \\ -3 & 5 \end{bmatrix} = \begin{bmatrix} -3 & 6 \\ -9 & 14 \end{bmatrix}$

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Question 6

Doctors have become increasingly concerned about the sodium intake in the U.S. diet. Recommendations by the American Medical Association indicate that most individuals should not exceed 2400 mg of sodium per day. Liza ate 1 slice of pizza, 1 serving of ice cream, and 1 glass of soda for a total of 1030 mg of sodium. David ate 3 slices of pizza, no ice cream, and 2 glasses of soda for a total of 2420 mg of sodium. Melinda ate 2 slices of pizza, 1 serving of ice cream, and 2 glasses of soda for a total of 1910 mg of sodium. How much sodium is in one serving of each item?

Restriction: Use matrix inversion to answer to this question)

Question 7

A farmer has 200 acres of land suitable for cultivating wheat, beans, and rice. The cost per acre of cultivating wheat, beans, and rice. is \$40, \$60, and \$80, respectively. The farmer has \$12,600 available for cultivation. Each acre of wheat requires 20 labor-hours, each acre of beans requires 25 labor-hours, and each acre of rice requires 40 labor-hours. The farmer has a maximum of 5950 labor-hours available. If she wishes to use all her cultivatable land, the entire budget, and all the labor available, how many acres of each crop should she plant?

Restriction: Use Cramer' rule to answer to this question)

Question 8

Solve the system of linear equations $\begin{cases} x_1 + 2x_2 + x_3 - x_4 = 5 \\ 3x_1 + 2x_2 + 4x_3 + 4x_4 = 16 \\ 4x_1 + 4x_2 + 3x_3 + 4x_4 = 22 \\ 2x_1 + x_3 + 5x_4 = 15 \end{cases}$

Restriction: Use matrix inversion to answer to this question)

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