FEEDBACK TUTORIAL LETTER

2nd SEMESTER 2019

ASSIGNMENT 2

INTRODUCTION TO MATHEMATICS

ITM111S
Course Name: INTRODUCTION TO MATHEMATICS – BUSINESS AND MANAGEMENT
Course Code: ITM111S
Department: MATHEMATICS AND STATISTICS
Course Duration: ONE SEMESTER
NQF Level and Credit: ENTER THE NQF LEVEL AND CREDITS OF THE COURSE
Moodle Enrollment Key: NONE

Marker-tutor Details
Tel.: 061-207 2373
E-mail: bobabueki@nust.na

ASSIGNMENT 1 FEEDBACK TUTORIAL LETTER

Congratulations for completing and submitting your ITM111S assignment 2 on time.
I have made comments in your answer scripts. Please take those comments seriously so that you can do better in your end-of-semester examination.

Your marker-tutors for ITM111S wish you the very best.
Question 1 (20 marks) (Set theory)

1.1 The following sets are given:
   \[ S = \{a, b, c, d, e, 1, 2, 3, 4, 5\} \; ; \; A = \{a, c, d, 3, 5\} \; ; \; B = \{b, c, 2, 3, 4\} \]

1.1.1 Represent the information given above in a Venn diagram.

![Venn Diagram](image)

1.1.2 List the elements of the set \( A' \cap B \).
   \[ A' = \{b, e, 1, 2, 4\} \]
   \[ A' \cap B = \{b, 2, 4\} \]

1.2 At Safari Athletic Club, 50 athletes play cricket, 50 play hockey and 40 play volley ball. 15 play both cricket and hockey, 20 play both hockey and volley ball, 15 play cricket and volley ball and 10 play all three. Every athlete plays in at least one of these sporting codes.

1.2.1 Copy and represent this information in the following Venn diagram by filling in the question-marked sections.

![Venn Diagram](image)
1.2.2 How many athletes play only cricket? (1)
  30 athletes

1.2.3 How many athletes play only hockey? (1)
  25 athletes

1.2.4 How many athletes play only volley ball? (1)
  15 athletes

Question 2 (25 marks) (Matrices and linear inequalities)

2.1 The following matrices are given:

\[ M = \begin{pmatrix} 2 & 0 \\ -3 & 4 \end{pmatrix} \quad N = \begin{pmatrix} -2 & 5 \\ -3 & 4 \end{pmatrix} \]

2.1.1 Determine the matrix \(3M - 4N\) (4)

\[3M - 4N = \begin{pmatrix} 6 & 0 \\ -9 & 12 \end{pmatrix} - \begin{pmatrix} -8 & 20 \\ -12 & 16 \end{pmatrix} = \begin{pmatrix} 14 & -20 \\ 3 & -4 \end{pmatrix}\]

2.1.2 Find the matrix \(MN\) (4)

\[MN = \begin{pmatrix} -4 & 10 \\ -6 & 1 \end{pmatrix}\]

2.1.3 What is \(N^{-1}\)? (4)
\[ \text{det}(N) = 7 \]
\[ N^{-1} = \frac{1}{7} \begin{pmatrix} 4 & 1 \\ 3 & -2 \end{pmatrix}^{-1} \]
\[ = \begin{pmatrix} \frac{1}{7} & -\frac{1}{7} \\ \frac{3}{7} & -\frac{2}{7} \end{pmatrix} \]

2.2 Use Cramer's rule to solve the simultaneous equations \( 2x + 5y = 14 \) and \( 3x - 4y = -25 \).

\[
\Delta = \begin{vmatrix} 2 & 5 \\ 3 & -4 \end{vmatrix} = -23 \]
\[ \Delta_x = \begin{vmatrix} 14 & 5 \\ -25 & -4 \end{vmatrix} = 69 \]
\[ \Delta_y = \begin{vmatrix} 2 & 14 \\ 3 & -25 \end{vmatrix} = -92 \]
\[ \therefore x = \frac{69}{-23} = -3 \quad \text{and} \quad y = \frac{-92}{-23} = 4 \]

2.3 Solve the following linear inequality \( \frac{x+5}{4} \leq \frac{6x-1}{3} \leq \frac{1}{2}(x+8) \) and represent your solution on a number line.

\[ \frac{x+5}{4} \leq \frac{6x-1}{3} \]
\[ \therefore 3x + 15 \leq 24x - 4 \]
\[ \therefore -21x \leq -19 \]
\[ \therefore x \geq \frac{19}{21} \]

\[ \frac{6x-1}{3} \leq \frac{1}{2}(x+8) \]
\[ \therefore 12x - 2 \leq 3x + 24 \]
\[ \therefore 9x \leq 26 \]
\[ \therefore x \leq \frac{26}{9} \]
Question 3 (16 marks) (Progressions)

3.1 The progression 5, 6.5, 8, 9.5, 11, ... is given. Determine the hundredth term and the sum of the first hundred terms of this progression correct to 2 decimal places.

\[ d = 1.5 \]

\[ T_{100} = 5 + (100 - 1)(1.5) \]

\[ = 5 + 148.5 \]

\[ = 153.50 \text{ correct to 2 decimal places} \]

\[ S_{100} = \frac{100}{2} \{2(5) + (100 - 1)(1.5)\} \]

\[ = 50(10 + 148.5) \]

\[ = 7925.00 \text{ correct to 2 decimal places} \]

Hundredth term is 153.50 and the sum of the first hundred terms is 7925.00

3.2 The progression 2, \(-3\), \(\frac{9}{2}\), \(-\frac{27}{4}\), \(\frac{81}{8}\), ... is given. Determine the twelfth term and the sum of the first twelve terms of this progression each correct to 2 decimal places.

\[ r = -\frac{3}{2} \]

\[ T_{12} = 2 \times \left(-\frac{3}{2}\right)^{12-1} \]

\[ = 2 \times -86.49755854 \]

\[ = -172.995 \]

\[ = -173.00 \text{ correct to 2 decimal places} \]
\[ S_{12} = \frac{2\left(\left(-\frac{3}{2}\right)^2 - 1\right)}{\left(-\frac{3}{2}\right) - 1} \]
\[ = \frac{257.49268}{-2.5} \]
\[ = -102.99707 \]
\[ = -103.00 \text{ correct to 2 decimal places} \]

Twelfth term is $-173.00$ and the sum of the first hundred terms is $-103.00$

Question 4 (15 marks) (Proportions and interests)

4.1 Copy and fill in the six empty cells in the following portion of an invoice:

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit price (N$)</th>
<th>Price (N$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chairs</td>
<td>105</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>Canopy</td>
<td></td>
<td>1020.00</td>
<td>2040.00</td>
</tr>
<tr>
<td>Tables</td>
<td>6</td>
<td></td>
<td>534.00</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15% VAT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit price (N$)</th>
<th>Price (N$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chairs</td>
<td>105</td>
<td>75</td>
<td>7875.00</td>
</tr>
<tr>
<td>Canopy</td>
<td>2</td>
<td>1020.00</td>
<td>2040.00</td>
</tr>
<tr>
<td>Tables</td>
<td>6</td>
<td>84</td>
<td>504.00</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
<td>10419.00</td>
</tr>
<tr>
<td>15% VAT</td>
<td></td>
<td></td>
<td>1562.85</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>11981.85</td>
</tr>
</tbody>
</table>

4.2 Mr. Amunyela invested N$50000.00 in a savings account for five years at 4% interest per annum.

4.2.1 Calculate the amount due to Mr. Amunyela if the interest was simple.
\[ A = 50000(1 + 5 \times 0.04) \checkmark \]
\[ = 50000 \times 1.2 \checkmark \]
\[ = 60000 \checkmark \]

*Amount due to Mr. Amunyela is N\$60000.00 \checkmark*

4.2.2 Calculate the amount due to Mr. Amunyela if the interest was compounded semi-annually. \(5\)

\[ A = 50000(1 + 0.02)^{10} \checkmark \]
\[ = 50000 \times 1.21899442 \checkmark \]
\[ = 60949.721 \checkmark \]

*Amount due to Mr. Amunyela is N\$60949.72 \checkmark*