FEEDBACK TUTORIAL LETTER

2nd SEMESTER 2020

ASSIGNMENT 2

INTRODUCTION TO MATHEMATICS

ITM111S
Course Name: INTRODUCTION TO MATHEMATICS – BUSINESS AND MANAGEMENT
Course Code: ITM111D
Department: MATHEMATICS AND STATISTICS
Course Duration: ONE SEMESTER

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ASSIGNMENT 1 FEEDBACK TUTORIAL LETTER

Congratulations for completing and submitting your ITM111D assignment 2 despite the challenges that came with Covid-19.

We have made comments in your answer scripts. Please take those comments seriously so that you can do better in your other assessments.

Your marker-tutors for ITM111D wish you the very best.
Assignment 2

Question 1 (9 marks)

Out of 360 students interviewed, it was found that 185 students speak Spanish (S), 55 students speak neither Spanish nor Portuguese. Furthermore, \((x + 7)\) students speak Portuguese (P) only and \(x\) speak both languages.

1.1 Show the information as given above on a Venn diagram.  

1.2 Determine the value of \(x\).

\[(185 - x) + x + (x + 7) + 55 = 360\]

\[x = 113\]

1.3 How many students speak Portuguese?

\[113 + 113 + 7 = 233\]
Question 2 (14 marks)

Let \( A = \begin{pmatrix} 2 & 5 \\ 0 & 1 \end{pmatrix}, \quad B = \begin{pmatrix} a & 2b \\ 0 & c \end{pmatrix} \) and \( C = \begin{pmatrix} 11 & -5 \\ 3 & -4 \end{pmatrix} \), be three matrices.

2.1 Determine the matrix \( C^2 \).

\[
C^2 = \begin{pmatrix} 11 & -5 \\ 3 & -4 \end{pmatrix} \begin{pmatrix} 11 & -5 \\ 3 & -4 \end{pmatrix} = \begin{pmatrix} 106 & -35 \\ 21 & 1 \end{pmatrix}
\]

(4)

2.2 Calculate matrix \( D \) such that \( 2A + D = 4C \).

\[
D = 4C - 2A
= \begin{pmatrix} 44 & -20 \\ 12 & -16 \end{pmatrix} - \begin{pmatrix} 4 & 10 \\ 0 & 2 \end{pmatrix}
= \begin{pmatrix} 40 & -30 \\ 12 & -18 \end{pmatrix}
\]

(3)

2.3 Determine the values of \( a, b, c \) such that \( AB = \begin{pmatrix} 4 & 19 \\ 0 & 3 \end{pmatrix} \).

(7)
\[ AB = \begin{pmatrix} 2a & 4b + 5c \\ 0 & c \end{pmatrix} \]

EQuating corresponding entries:
\[ 2a = 4 \Rightarrow a = 2 \checkmark \]
\[ c = 3 \checkmark \]
\[ 4b + 5c = 19 \Rightarrow b = 1 \checkmark \]

Question 3 (11 marks)

3.1 Find the sum of the first 30 terms of the series 3, 5•5, 8, 10•5, ...  (3)
\[
\begin{align*}
a &= 3 \\
d &= 2.5 \checkmark \\
S_{30} &= \frac{30}{2}(2(3) + (30 - 1)(2.5)) \checkmark \\
&= 15\{6 + 47.5\} \\
&= 802.5 \checkmark
\end{align*}
\]

3.2 The fourth term of a geometric progression is 27 and the seventh term is 729.

3.2.1 Determine the first term and the common ration of the progression.  (5)
\[
\begin{align*}
ar^3 &= 27 \checkmark \\
ar^6 &= 729 \checkmark \\
ar^6 &= \frac{729}{27} \checkmark \\
\frac{ar^6}{ar^3} &= \frac{729}{27} \\
\therefore r^3 &= 27 \\
Common\ ratio: r &= 3 \checkmark \\
a(3)^3 &= 27 \Rightarrow \text{First term: } a = 1 \checkmark
\end{align*}
\]
3.2.2 Calculate the sum of the first ten terms of the progression.

\[ S_{10} = \frac{1(3^{10} - 1)}{3 - 1} \]

\[ = \frac{59048}{2} \]

\[ = 29524 \]

Question 4 (16 marks)

4.1 Copy and complete the following part of an invoice:

<table>
<thead>
<tr>
<th>Item</th>
<th>Price (N$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 chairs @ N$250 per pack of ten chairs</td>
<td></td>
</tr>
<tr>
<td>5 canopies @ N$140 each</td>
<td></td>
</tr>
<tr>
<td>Sub total</td>
<td></td>
</tr>
<tr>
<td>VAT on subtotal @ 15.5%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Less deposit</td>
<td>2500.00</td>
</tr>
<tr>
<td>Balance to pay</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
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</tr>
</thead>
<tbody>
<tr>
<td>120 chairs @ N$250 per pack of ten chairs</td>
<td>3000.00</td>
</tr>
<tr>
<td>5 canopies @ N$140 each</td>
<td>700.00</td>
</tr>
<tr>
<td>Sub total</td>
<td>3700.00</td>
</tr>
<tr>
<td>VAT on subtotal @ 15.5%</td>
<td>573.50</td>
</tr>
<tr>
<td>Total</td>
<td>4273.50</td>
</tr>
<tr>
<td>Less deposit</td>
<td>2500.00</td>
</tr>
<tr>
<td>Balance to pay</td>
<td>1773.50</td>
</tr>
</tbody>
</table>
4.2 If twelve men can jointly complete a task in thirty-six days, how many men could have jointly completed that task in 24 days assuming that all men worked at the same rate?

36 days for 12 men. 
:. 1 day for 36 \times 12 \text{ men.}

24 days for \frac{36 \times 12}{24}

= 18 \text{ men}

4.3 Maria invested N$15000.00 at 4.5% per annum for 3 years with interest compounded quarterly. Peter also invested N$15000.00 at 4.5% for 3 years, interest simple. Use calculations to determine who made a wiser investment.

Maria: \[ A = 15000 \left(1 + \frac{4.5}{100 \times 4}\right)^{3 \times 4} \]

= 15000(1 + 0.01125)^{12}
= 15000 \times 1.143674441
= N$17155.12

Peter: \[ A = 15000 \left(1 + \frac{4.5}{100} \times 3\right) \]

= 15000(1 + 0.135)
= 15000 \times 1.135
= N$17025.00

Maria made a better investment.

End of Assignment 2. Total marks: 50