FEEDBACK TUTORIAL LETTER

2nd SEMESTER 2019

ASSIGNMENT 1

INTRODUCTION TO MATHEMATICS

ITM111S
ASSIGNMENT 1 FEEDBACK TUTORIAL LETTER

Congratulations for completing and submitting your ITM111S assignment 1 on time.
I have made comments in your answer scripts. Please take those comments seriously so that you can
do better in your second assignment and end-of-semester examination.

Your marker-tutors for ITM111S wish you the very best.
Question 1 (11 marks) (Fractions)

1.1 Evaluate \( \frac{2}{5} + \frac{1}{3} (\frac{3}{4} - \frac{1}{4}) + \frac{2}{3} + \frac{11}{9} \) without the use of a calculator. (4)

\[
\frac{2}{5} + \frac{1}{3} \left( \frac{3}{4} - \frac{1}{4} \right) + \frac{2}{3} + \frac{11}{9}
\]

\[
= \left( \frac{2}{5} + \frac{1}{3} \right) + \left( \frac{3}{4} - \frac{1}{4} \right) \times \frac{2}{3} + \frac{11}{9}
\]

\[
= \frac{2}{5} + \frac{1}{3} \times \frac{2}{3} + \frac{11}{9}
\]

\[
= \frac{2}{5} + \frac{2}{9} + \frac{11}{9}
\]

\[
= \frac{2}{5} + \frac{12}{9}
\]

\[
= \frac{5}{2} + 3
\]

\[
= \frac{5}{2} + \frac{18}{9}
\]

\[
= \frac{5}{2} + 2
\]

\[
= \frac{27}{9}
\]

\[
= \frac{27}{9}
\]

\[
= \frac{27}{9}
\]

1.2 Mrs. Nadi accumulated a number of shares over a period of time. She sold \( \frac{1}{5} \) of her shares to her brother, \( \frac{4}{11} \) to her cousin and half of the remaining shares to Emily. She kept the leftover shares for herself.

1.2.1 What fraction of her original shares did Mrs. Nadi keep for herself? (4)

\[
\frac{1}{5} + \frac{4}{11} = \frac{31}{55}
\]

Remaining fraction is \( \frac{24}{55} \)

Half of \( \frac{24}{55} \) is \( \frac{12}{55} \) for Emily

Mrs. Nadi kept \( \frac{12}{55} \) for herself

Note that \( \frac{1}{5} \) and \( \frac{4}{11} \) are fractions of the original shares while \( \frac{1}{2} \) is a fraction of the remainder.
1.2.2 If Mrs. Nadi kept seventy-two shares for herself, how many shares did she accumulate in the first place?

\[
\frac{12}{55} \text{ is equivalent to } 72 \checkmark
\]

\[
\therefore 1 \text{ is equivalent to } (72 \div \frac{12}{55}) \times 1 = 330
\]

Mrs. Nadi accumulated 330 shares in the first place \checkmark

Question 2 (11 marks) (Indices, surds and logarithms)

2.1 Evaluate \( \log_3 27 - \log_{\frac{1}{2}} \left(\frac{1}{4}\right) + \log_4 \sqrt{(10 + 6)^2} \) without the use of a scientific calculator. You MUST show all necessary steps for marks.

\[
\log_3 27 - \log_{\frac{1}{2}} \left(\frac{1}{4}\right) + \log_4 \sqrt{(10 + 6)^2}
\]

\[
= \log_3 3^3 - \log_{\frac{1}{2}} \left(\frac{1}{2}\right)^2 + \log_4 16
\]

\[
= 3 \log_3 3 - 2 \log_{\frac{1}{2}} \left(\frac{1}{2}\right) + \log_4 4^2
\]

\[
= 3 - 2 + 2
\]

\[
= 3 \checkmark
\]

2.2 Solve the indicial equation \( 2^x + 2^{x+1} - 2^{x+1} = 40 \) for the value of \( x \).
\[ 2^x + 2^{x+1} - 2^{x-1} = 40 \]
\[ \therefore 2^x + 2 \times 2^x - \frac{1}{2} \times 2^x = 40 \]
\[ \therefore 2^x(1 + 2 - \frac{1}{2}) = 40 \]
\[ \therefore 2.5 	imes 2^x = 40 \]
\[ \therefore 2^x = 16 \]
\[ \therefore 2^x = 2^4 \text{ because } 16 = 2^4 \]
\[ \therefore x = 4 \]

**Question 3 (18 marks) (Algebraic expressions)**

3.1 Expand and simplify the expression \((ab + d)^2 + (a + d)(b - d)\).

\[
(ab + d)^2 + (a + d)(b - d) = a^2b^2 + abd + abd + d^2 + ab - ad + bd - d^2 \]
\[= a^2b^2 + 2abd + ab - ad + bd \]

\[\text{Note that } (ab + d)^2 = (ab + d)(ab + d)\]

3.2 Factorize the expression \(9ay - 4dx - 6dy + 6ax\) completely.

\[9ay - 4dx - 6dy + 6ax = 3y(3a - 2d) + 2x(3a - 2d)\]
\[= (3y + 2x)(3a - 2d)\]

3.3 The area \(A\) of a rectangle is given as \(Area = length \times width\). The length \(l\) of a rectangular soccer field is 20 metres longer than the width \(w\).

3.3.1 Write down an expression for the area of the soccer field in terms of \(w\).
$l = w + 20 \checkmark$

$A = (w + 20) \times w \checkmark$

$\therefore A = w^2 + 20w \checkmark$

3.3.2 If the area is 4800 square metres, calculate the length of the soccer field.

$w^2 + 20w = 4800 \checkmark$

$w^2 + 20w - 4800 = 0 \checkmark$

$(w - 60)(w + 80) = 0 \checkmark$

Since width cannot be negative, then $w = 60 \checkmark$

$\therefore l = 60 + 20 = 80$ metres \checkmark

**Question 4 (24 marks) (Linear and quadratic equations)**

4.1 In a class of 100 students, the number of girls is ten more than four times the number of boys.

Use step by step calculations to determine the number of girls in that class.

Let number of boys be $b$ and number of girls be $g$ \checkmark

$\therefore g = 4b + 10 \checkmark$

Hence $4b + 10 + b = 100 \checkmark$

$\therefore 5b = 90 \checkmark$

$\therefore b = 18 \checkmark$

Thus $g = 4 \times 18 + 10$

$= 82 \checkmark$

There are 82 girls \checkmark
4.2 Two kilograms of sugar \( (s) \) and five kilograms of maize meal \( (m) \) cost N\$41. Three kilograms of sugar and ten kilograms of maize meal cost N\$74.50. Use the method of elimination to calculate how much five kilograms of sugar and eight kilograms of maize meal cost altogether. (You must first write down two equations in terms of \( s \) and \( m \).) (8)

\[
2s + 5m = 41 \quad (eq1)
\]

\[
3s + 10m = 74.5 \quad (eq2)
\]

\[
(eq1) \times 3 \quad 6s + 15m = 123 \quad (eq3)
\]

\[
(eq2) \times 2 \quad 6s + 20m = 149 \quad (eq4)
\]

Subtract \( eq3 \) from \( eq4 \) to get \( 5m = 26 \)

\[
\therefore m = 5.2
\]

Thus \( 2s + 5(5.2) = 41 \)

\[
\therefore s = 7.5
\]

But \( 5s + 8m = 5(7.5) + 8(5.2) \)

\[
= 79.1
\]

5kg of sugar and 8kg of maize meal cost N\$79.10

4.3 Consider the quadratic equation \( 8x^2 - 2x - 15 = 0 \).

4.3.1 Solve the given quadratic equation by factorization. (4)

\[
8x^2 - 2x - 15 = 0
\]

\[
\therefore (2x - 3)(4x + 5) = 0
\]

\[
\therefore x = \frac{3}{2} \text{ or } x = -\frac{5}{4}
\]

4.3.2 Solve the given quadratic equation using the quadratic formula \( x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \). (5)
\[ x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(8)(-15)}}{2(8)} \]
\[ = \frac{-2 \pm \sqrt{484}}{16} \]
\[ = \frac{2 \pm 22}{16} \]
\[ \therefore x = \frac{2 + 22}{16} = \frac{3}{2} \text{ or } x = \frac{2 - 22}{16} = -\frac{5}{4} \]

The division lines for expression must always be drawn to convey the right information and meaning.

For example:

\[ \frac{4 + 6}{2} = \frac{10}{2} = 5 \]
\[ 4 + \frac{6}{2} = 4 + 3 = 7 \]
\[ \frac{4 + 6}{2} = 2 + 6 = 8 \]

You see that the division line has meaning.