MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2016/2017

THIRD YEAR FIRST SEMESTER EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN APPLIED STATISTICS, ACTUARIAL SCIENCE, MATHEMATICAL SCIENCE AND MATHEMATICS AND ECONOMICS WITH INFORMATION TECHNOLOGY

MAIN CAMPUS

MIT 303: COMPUTERS APPLIED TO MATHEMATICS

Date: 9ᵗʰ December, 2016   Time: 12.00 – 3.00 pm

INSTRUCTIONS:

- Answer ATLEAST ONE question in each section.
- Observe further instructions on the answer booklet.

SECTION 1 (30 MARKS)

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1. (a) What do you understand by a program as used in this course? [2 marks]

   (b) State any THREE types of errors that one can incur when writing a python program. Give an example of how each may occur.

   [6 marks]

   (c) Write the source code that will produce the table below.

Program	Core Units	
Math Science	MTT 303	Computers applied to mathematics
Math Econ	AEC 101	Macro Economics
Math Comp	CCS 202	Discrete mathematics

Table 1: Core Units

   [6 marks]

   (d) Write a python program that asks the user to enter two integer a and b and use a while loop to print as a solution a^b. Do not use the inbuilt power operator.

   [5 marks]

   (e) MS word and Libra office writer are example of WYSIWYG programs. Explain TWO reasons why you would prefer creating a document in LaTeX rather than WYSIWYG?

   [4 marks]

   (f) State at FIVE key words used in python. Give an example utilizing all the key words you have listed. Underline the key word in your written program.

   [6 marks]

SECTION 2 (20 MARKS)

2. Write a python program that will:

   (a) Compute the coefficients a and b in the mathematical expression for a straight line $y = ax + b$ that goes through two points (x_0, y_0) and (x_1, y_1) [4 marks]

   (b) Calculate the maximum of three real numbers, using at most two conditional instructions "if".

   [6 marks]

   (c) Given three numbers, sort them from minimum to the maximum, using at most three conditional instructions.   [10 marks]

3. (a) Use a 'while' loop to write a program that will read an integer number between 0 and 9 and print its multiplication table upto the 14th step. The number is provided by the user. If the wrong number entered ask the user again to enter the correct number.

   [7 marks]

   (b) Write a python program to find the standard deviation of a set of n numbers where n is provided by the user. Then request the user to enter the n numbers one by one.
   [13 marks]

SECTION 3 (20 MARKS)

4. (a) Identify the errors in the following extract. State the type of error in the extract and suggest the correction.   [6 marks]

```
1       \documentclass[12pt,a4paper]{article}
2
3       \usepackage{amsmath, amsfonts}
4
1       \usepackage{amssymbol}
5       \begin{document}
6
7       Let $u$ & $$$. We can write both of these vectors as linear combinati
8       of the $v_i$'s:
9       \begin{align}
10      u = &\alpha_1 v_1 + \alpha_2 v_2 + \cdots + \alpha_n v_n
11      v = & \beta_1 v_1 + \beta_2 v_2 + \cdots + \beta_n v_n.
12      \end{align}
13      Then
14      $u + v = (\alpha_1 + \beta_1) v_1 + \cdots + (\alpha_n + \beta_n)v_n
15      is a linear combination of the v_i 's. For \alpha\inF.
16      \end{document}
```

(b) Identify the packages required in order to run the following commands in LaTeX.

   [3 marks]

(i) \includegraphics

(ii) \multirow

(iii) \FloatBarrier

(c) Write the source code to produce the table below: [11 marks]

Chief Executive Officer			
Branch Manager	Head of Marketing	Marketing Officer	Sales Person
	Head of Finance	Finance Officer	
	Head of P.R.	Adverts Officer	Bill Boards
	Human Resources	Recruitment Officer	

Table 2: Office

5. (a) List the four individual counters that are associated with itemized lists.

[4 marks]

(b) Identify any four LaTeX environments you might require as a mathematician. Give an example of how you would use it and show the expected output.

[8 marks]

(c) Write the python code that will produce the following: [8 marks]

(i) $\begin{pmatrix} \frac{1}{2} & 6 & \binom{n}{k} \\ a & n-2 & -a \end{pmatrix}$

(ii) $\left. \frac{a+k}{3} \right|_1^3$

(iii) $\lim_{x \to \infty} \left(\frac{1-x}{|1-x|} \right)$

(iv) $\frac{\frac{1}{a} + \frac{1}{x}}{y-z}$