RISON COLLEGE INTERNAL EXAMINATION 2021
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION
SCHOOL BASED ASSESSMENT
PURE MATHEMATICS
UNIT I – TEST 3
1 Hour and 20 Minutes

NAME OF STUDENT: ______________________________
SCHOOL CODE: 030014
DATE: ______________________________

This examination paper consists of 11 printed pages and 2 blank pages for extra working.

The paper consists of 7 questions.

The maximum mark for this examination is 60.

INSTRUCTIONS TO CANDIDATES

1. Write your name clearly in the space above.
2. Answer ALL questions in the SPACES PROVIDED.
3. Number your questions **carefully and identically to those on the question paper**.
4. Unless otherwise stated in the question, any numerical answer that is not exact, MUST be written correct to three (3) significant figures

EXAMINATION MATERIALS ALLOWED

1. Mathematical formulae
2. Scientific calculator (non-programmable, non-graphical)

1. Roger and Andy play a tennis match in which the first person to win two sets wins the match. The probability that Roger wins the first set is 0.6. For sets after the first, the probability that Roger wins the set is 0.7 if he won the previous set, and is 0.25 if he lost the previous set. No set is drawn.
   (i) Find the probability that there is a winner of the match after exactly two sets. [3]

   (ii) Find the probability that Andy wins the match given that there is a winner of the match after exactly two sets. [2]

Total: 5 marks

2. A group of 5 performers needs to be selected from 15 applicants consisting of 10 females and 5 males. Anna would like the group of 5 performers to contain more males than females.
   (a) Find the number of different selections of 5 performers with more males than females. [3]

   (b) Two of the applicants are Mr and Mrs Fields. Find the number of different selections that include Mr and Mrs Fields and also fulfils Anna's requirement. [3]

Total: 6 marks

3. Find how many different numbers can be made from some or all of the digits of the number 1 345 789 if
   (i) all seven digits are used, the odd digits are all together and no digits are repeated, [2]

   (ii) the numbers made are even numbers between 3000 and 5000, and no digits are repeated, [3]

   (iii) the numbers made are multiples of 5 which are less than 1000, and digits can be repeated. [3]

Total: 8 marks

4. A and B are two matrices given below

$$A = \begin{pmatrix} 1 & x & 1 \\ 2 & 1 & -2 \\ 3 & 0 & 0 \end{pmatrix} \text{ and } B = \begin{pmatrix} 1 & 2 & 1 \\ 2 & 3 & 1 \\ 5 & 1 & 2 \end{pmatrix}$$

   (i) Determine the range of values of x for which A^{-1} exists. [4]

   (ii) Given that $\det(AB) = 27$, show that $x = \frac{1}{4}$. [4]

   (iii) Hence, obtain A^{-1} [4]

Total: 12 marks

5. Solve, using row reduction, the system of equations

$$x - y + z = 7$$
$$x + 2y - z = -1$$
$$3y - z = -7$$

[9]

Total: 9 marks

6. Solve the differential equation $x\frac{dy}{dx} - 3y = x^4e^{2x}$ for y in terms of x, given that $y = 0$ when $x = 1$. [8]

Total: 8 marks

7. Find the solution of the differential equation $y'' + 2y' + 5y = e^{-x}$ for which $y = y' = 0$ when $x = 0$. [12]

Total: 12 marks

END OF TEST