REPUBLIQUE DU CAMEROUN
Paix – Travail – Patrie

MINISTERE DES ENSEIGNEMENTS SECONDAIRES

DELEGATION REGIONALE DE L'OUEST

INSPECTION REGIONALE DE PEDAGOGIE
………………..

REPUBLC OF CAMEROON
Peace – Work - Fatherland

MINISTRY OF SECONDARY EDUCATION

REGIONAL DELGATION FOR THE WEST

REGIONAL INSPECTORATE OF PEDAGOGY
………………..

MATHS 770 **West General Certificate of EDUCATION MOCK EXAMINATION**

March 2019 **ADVANCED LEVEL**

THE REGIONAL DELEGATION OF SECONDARY EDUCATION IN ASSOCIATION WITH THE **TEACHERS' RESOURCE UNIT**	SUBJECT CODE NUMBER **770**	PAPER NUMBER 3
MAHTEMATICS TEACHERS' PEDAGOGIC GROUP	SUBJECT TITLE **Pure mathematics with Statistics**	

THREE HOURS

Full marks may be obtained for answers to ALL questions.

All questions carry equal marks.

You are reminded of the necessity for good English and orderly presentation in your answers.

Mathematical formulae Booklets published by the Board are allowed.

In calculations, you are advised to show all the steps in your working giving your answer at each stage.

Calculators are allowed.

Start each question on a fresh page.

1. A random sample of 60 students had the following distribution of marks.

Marks	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44
No of students	1	4	10	13	12	10	5	3	2

(a) Calculate to one decimal place, the mean, the mode and the standard deviation of the marks.
(b) Draw a cumulative frequency graph of the distribution.
(c) Find estimates for the median mark and the semi-inter-quartile range of the marks.
A second sample of 40 students is selected and is found to have a mean mark of 25 with a standard deviation of 4 marks.
(d) Find the mean and standard deviation of the marks of the combined set of 100 students.

---

2. (i) The events A and B are such that $P(A|B)=\frac{2}{3}$, $P(A\cup B)=\frac{7}{10}$ and $P(B|A)=\frac{5}{9}$.

(a) Show that P (B) = $\frac{5}{6}$P(A).
Hence or otherwise, find:
(b) P (B)
(c) $P(A'\cap B)$

(ii) 80% of the inhabitants of a certain region are said to have taken preventive measures against cholera. During an outbreak of the cholera epidemic, $\frac{1}{5}$ of the people who previously took preventive measures were infected and $\frac{2}{3}$ of those who did not take preventive measures were infected. Find the probability that an individual chosen at random from the region
(a) is infected,
(b) is infected or was given preventive measures,
(c) took preventive measures given that the individual is infected.

---

3. A random variable X takes the integer values x with probability P (x) given that

$$P(x) = \begin{cases} kx^2 & , x = 1, 2, 3 \\ k(7-x)^2 & , x = 4, 5, 6 \\ 0 & , elsewhere \end{cases}$$

(a) Find the value of k.
(b) Find the mean and variance of X.
(c) Construct the probability distribution of X.
Given that the variable Y is defined by Y = 3x – 2.
(d) find the mean and variance of Y.

---

4. The continuous random variable X has cumulative frequency distribution function F (x), where

$$F(x) = \begin{cases} 0 & , x \le 0 \\ \frac{1}{3}(ax) & , 0 \le x \le 1 \\ \frac{1}{3}x + b & , 1 \le x \le 2 \\ 1 & , x \ge 2 \end{cases}.$$ Find:

(a) The values of a and b.

(b) The probability density function $f(x)$.
(c) The mean μ.
(d) The standard deviation.
(e) $P(|x-\mu|<\sigma)$

5. (i) Prove that the mean of a binomial distribution with parameters n and p is np.
Given that X ~ Bin (n, p), with p = 0.2 and E (X) = 2.4, find:
(a) n,
(b) the standard deviation σ of X.
(ii) Given that X, Y and W are independent random variables,
X ~ Bin (3, 0.2), Y ~ Bin (5, 0.2), and W ~ Bin (8, 0.2).
(a) State the distribution of X + Y + W.
(b) Find P (X + Y + W = 4)
(c) Find V (X + Y + W)

6. (i) Explain what is meant by a simple random sample.
(ii) The same mathematical test was given to two random samples of upper sixth students in two schools. The results are summarised as follows:
School 1: $n_1 = 30$, $\bar{x} = 41$, $S_x^2 = 39.87$
School 2: $n_2 = 35$, $\bar{x} = 47$, $S_y^2 = 42.43$
(a) Find to two decimal places an estimate of the population variance from the two samples.
(b) Assuming that the distribution of marks is normal with a common population variance, test at 5% level whether there is a significant difference in the mathematical ability of upper sixth students from the two schools.
(c) Give the reason for your choice of the alternative hypothesis.

7. The probability that a woman from a particular area has brown eyes is $\frac{2}{5}$. A random sample of 100 women is to be selected from this area. Using the normal distribution as an approximation to the binomial distribution, estimate to 3 decimal places the probability that:
(a) At least half of the women will have brown eyes.
(b) The number of women who will have brown eyes will be between 30 and 45 inclusive.
(c) Exactly 35 women will have brown eyes.

8. The table below shows the inflation rate, x percent, and the unemployment rate, y percent, for 10 different countries in the month of December 2018.

Inflation rate, x	13.9	21.4	9.6	1.5	31.7	23.1	18.4	34.4	27.6	5.6
Unemployment rate, y	2.9	11.3	5.2	6.1	9.0	8.8	5.9	15.6	9.8	3.7

Calculate, correct to 3 decimal places
(a) The product moment correlation coefficient for this data.
(b) The least squares regression line of inflation rate on unemployment rate.
(c) The Kendall's coefficient of rank correlation between inflation rate and unemployment rate. You may use
$\sum x = 187.2$, $\sum x^2 = 4599.12$, $\sum y = 78.3$, $\sum y^2 = 746.69$, $\sum xy = 1766.18$.