Math With Stats 3
0770

CAMEROON GENERAL CERTIFCATE OF EDUCATION BOARD

General Certificate of Education Examination

JUNE 2016 **ADVANCED LEVEL**

Subject Title	**Mathematics With Statistics**
Paper No.	**3**
Subject Code No.	**0770**

Two and a half hours

Full marks may be obtained for answers to ALL questions. All questions carry equal marks.

Mathematical formulae and tables produced by the GCE Board are allowed.

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

Electronic calculators may be used.

Start each question on a fresh page.

1. The table below shows the distribution of marks obtained by some candidates in an examination.

Marks, x	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
No of cand. f	10	26	42	66	83	71	52	30	14	6

(a) Calculate to two decimal places, the mean mark of the distribution.
(b) By using 1cm to represent 20 candidates on the vertical axis and 2cm to represent 10 marks on the horizontal axis, draw a cumulative frequency curve for this distribution.
(c) Using your curve, estimate the number of candidates who passed in this examination, if the pass mark is at least 40.
(d) Estimate, also, the percentage of candidates who passed the examination.

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2. There are 2500 male and 2000 female students in a certain university. It is known that 5% of the male students and 0.75% of the female students wear reading glasses.
A student X is chosen at random from this university.
Find the probability that X
(a) wears reading glasses.
(b) is a female student, given that X wears reading glasses.
(c) is a male student or X wears reading glasses.

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3. A bank auditor finds out that a particular bookkeeping department makes averagely 1 error per week.
Find the probability that in a period of one week,
(a) exactly 4 errors will be made.
(b) at most 3 errors will be made.
(c) at least 5 errors will be made.
Calculate, also, to 4 decimal places, the probability that in a 7-week period, no error will be made.

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4. A random sample of 120 measurements is taken from a normal population. From the sample data given belo

$$\sum x = 1008, \sum (x - \bar{x})^2 = 172.8$$

Calculate,
(a) the unbiased estimates for the population mean and variance.
(b) a 97% confidence interval for the population mean.

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5. The probability mass function, f, of a discrete random variable, X, is defined by

$$f(x) = \begin{cases} kx, & for\ x = 1,2,3,4,5, \\ k(10-x), & for\ x = 6,7,8,9. \end{cases}$$

Calculate
(a) the value of the constant k,
(b) the mean and the variance of X,
(c) $E(2X-3)$ and $Var(2X-3)$.

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6. (i) A random variable X is such that $X \sim B\left(10, \frac{1}{5}\right)$. Find the values of
   (a) $P(X = 2)$,
   (b) $P(X \geq 1)$.

   (ii) The masses of mangoes from a certain orchard are normally distributed with a mean of 225.2 grams and and standard deviation 16.89 grams. A random sample of 100 mangoes selected from this orchard had a mean mass of 220.8 grams.
   Stating clearly, the null and alternative hypotheses, perform a hypothesis test at 5% level of significance to find out if this sample provides significant evidence of a reduction in the population mean mass.

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7. The probability density function, f , of a continuous random variable X , is defined as

$$f(x) = \begin{cases} \frac{4x}{81}(k - x^2), & \text{for } 0 \leq x \leq 3, \\ 0, & \text{elsewhere.} \end{cases}$$

Find (a) the value of the constant k,
(b) the mean and variance of X.

Given that the median of this distribution is m , show that $2m^4 - 36m^2 + 81 = 0$.

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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 2010.

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 three 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 $\sum x = 187.2$, $\sum x^2 = 4599.12$, $\sum y = 78.3$, $\sum y^2 = 746.69$, $\sum xy = 1766.18$