LAGOS CITY POLYTECHNIC, IKEJA
SCHOOL OF EINGEERING AND APPLIED SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
2013/2014 FIRST SEMESTER EXAMINATION

COURSE TITLE: **STATISTICAL THEORY I** **NO OF QUESTIONS : 6**
COURSE CODE: **STA 311** **TIME ALLOWED: 2HRS**
FOR WHOM: **HND YR I CS PT** **EXAMINER:**
NO OF STUDENT: **INSTRUCTIONS: ANSWER FOUR QUESTIONS**

1. (a) Distinguish between
   (i) Discrete and continuous variables (ii) Qualitative and Qualitative variables
   (b) Define the mathematical expectation of a continuous random variable.
   (c) Let a continuous random variable X follows a uniform distribution with parameters a and b such that a<b
   (i) Explicitly, write the probability density function of X
   (ii) Obtain the mean and variance of X
   (iii) Evaluate the mean and variance of X if a = 5 and b = 9.

2. (a) State Chebyshers inequality
   (b) Suppose a random variable X has mean $\mu = 12$ and variance $r^2 = 19$
   Determine
   (i) $p(9<x<15)$ (ii) $p(6<x<18)$ (iii) $p(3<x<21)$ (iv) $p(o<x<24)$
   Hint: Use Chebyshers Inequality

3. State and Prof Gauss Markor Theorem

4. Given $\hat{Y} = X\hat{\beta} + \hat{\varepsilon}$
   Proof that
   (i) $\beta = (x^1x)^{-1}x^1y$ (ii) $E[\beta] = \beta$ (iii) $V(\beta) = (x^1x)^{-1}\,\sigma^{\alpha 2}$ (iv) β is linear

5. (a) Define the moment generating function of a continuous random variable.
   (b) Let x follows an exponential distribution with p. a. f. $f(x) = \begin{cases} \theta e^{-ox} & x>o \\ o & \text{otherwise} \end{cases}$
   (i) Determine the moment generating function of x
   (ii) Hence or otherwise, determine the first moment andsecond moment about the origin
   (iii) Determine variance of x.

6. (a) Define the conditional probability of x given y
   (b) Given $f(x, y) = \begin{cases} kx^2y^3 & o\leq x\leq 1\ o\leq y\leq 2 \\ o & \text{otherwise} \end{cases}$