Mount Kenya University

UNIVERSITY EXAMINATION 2013/2014

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF NATURAL SCIENCES

BACHELOR OF EDUCATION SCIENCE
SCHOOL BASED

continuous random variable - takes unknown countably infinite number

UNIT CODE: BMA 222 UNIT TITLE: PROBABILITY AND STATISTICS II

DATE: DECEMBER 2013 MAIN EXAM TIME: 2 HOURS

ANSWER QUESTION ONE IN SECTION A AND ANY OTHER TWO QUESTIONS FROM SECTION B

Random variable - sample space assigned no's

SECTION A

1. A. Define a discrete random variable. (2 Marks)

   random variable which takes on finite or countably infinite no's

   b. Probability distribution function. (2 Marks)

A random variable Z has a probability function

Z	0	1	2	3	4	5	6	7	8
P(Z)	K	3K	5K	7K	9K	11K	13K	15K	17K

c. Determine the value k (3 Marks)

$81K = 1 \quad \therefore K = \frac{1}{81}$

d. Find $P(3 \le z < 6)$ (2 Marks)

$7(\frac{1}{81}) + 9(\frac{1}{81}) + 11(\frac{1}{81}) = \frac{7}{81} + \frac{9}{81} + \frac{11}{81} = 27/81$

The continuous random variable X has probability density function given by.

$$f(x) = \begin{cases} 2x \quad 0 \le x \le 1 \\ 0, otherwise \end{cases}$$

contin

DRVariable

Is a list of probabilities associated with each of the possible values or probability function or probability mass function

Probability distribution function (P.d.f)

- It a function that may be used to define a particular probability distribution

e. Show that the moment generating function of X is given by; $M_X(t)=\frac{2[e^t(t-1)+1]}{t^2}$ (4 Marks)

f. By Expanding $M_x(t)$ as a power series in t, find E(X) and E(X^2). (5 Marks)

g. Find the variance of X. (2 Marks)

Along a stretch of Thika super highways, breakdowns requiring the summoning of the breakdown services occur with a frequency of 2.5 per day, on average.

h. Find the probability that there will be exactly 2 breakdowns on a given day. (3 Marks)

i. Find the smallest integer c such that the probability of more c breakdowns in a day is less than 0.03. (4 Marks)

j. Find the probability that 0<X<3 (3 Marks)

SECTION B

2. The probability density function of a random variable X is;

$$f(x)=\begin{cases} x, & \text{for } 0\le x\le 1 \\ 2-x, & \text{for } 1\le x<2 \\ 0, & \text{otherwise}\end{cases}$$

i. Find cumulative distribution function (5 Marks)
ii. Find F(3/2) (2 Marks)
iii. Find the median of the distribution (3 Marks)

Under what circumstance would it be sensible to use?

a. The normal distribution as an approximation of the binomial distribution?

b. The Poisson distribution as an approximation of the Binomial distribution? (2 Marks)

(2 Marks)