



SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS

UNIT CODE: BMA 2102: PROBABILITY AND STATISTICS II

DATE: APRIL EXAMS

SCHOOL: BASHA

TIME: 1HR

Instructions: Answer ALL questions

1. The random variable X has probability function

$$f(x) = \begin{cases} kx, & x=1,2,3, \\ k(x+1), & x=4,5 \end{cases}$$

	1	2	3	4	5
f(x)	2k	2k	3k	5k	6k
	1/7	2/7	3/7	5/7	6/7

Where k is a constant

- a) Find the value of k (2marks)
- b) Find the exact value of E(X) (2marks)
- c) Show that, to 3s.f.  $\text{Var}(X) = 1.47$  (4marks)
- e) Find to 1 decimal place,  $\text{Var}(4-3X)$  (2marks)

2. The random variable Y has probability generating function  $M_Y(t)$  given by

$$M_Y(t) = \frac{1}{216} (2+t)^3 (2t+1)^3$$

- a) Find E(Y), when t = 1 (5marks)

The random variable X has a binomial distribution with n = 5 and p = 1/3

(b) Show that the probability generating function of the random variable  $W = 5 - X$  is

$$G_W(t) = \frac{(2t+1)^5}{3^5}$$

3. A continuous random variable X has a probability density function f(x) is defined by

$$f(x) = \begin{cases} k(x-2), & 2 \leq X \leq 3 \\ 0, & \text{elsewhere} \end{cases}, \text{ Where k is a constant}$$

Find

- a) The value of k (3marks)
- b) E(X) (2marks)
- c) The  $\text{Var}(3X-5)$  (4marks)

$(5-x) e^{-x}$

$5e^{-x} - e^{-x} x$

$\frac{1}{3} [5 \cdot 243 - 243 \cdot 810]$

$98485 + 196830$