

Registration Number .....

The Open University of Sri Lanka

B.Sc/B.Ed. DEGREE, CONTINUING EDUCATION PROGRAMME

No Book Test 2017/2018

Level 04 Applied Mathematics

ADU4300/ADE4300– Statistical Distribution Theory

Duration: - One hour



Date: - 24-07-2018

Time: 4.15 – 5.15

Answer all questions. Statistical tables are provided.

Write your answers in the question paper for question 1.

1.

From questions (1) to (5) underline the correct answer

Suppose  $X_1 \sim N(10,1)$        $X_2 \sim Bin(10,0.2)$        $X_3 \sim N(50,9)$        $X_4 \sim gamma(5,3)$   
 $X_5 \sim Poission(10)$ .  $X_1, X_2, X_3, X_4, X_5$  are mutually independent.

(1) Let  $Y = X_1 + 3$ 

- 1)  $Y \sim N(10,1)$       2)  $Y \sim N(13,4)$       3)  $Y \sim N(13,1)$   
 4) None of the above

(2) Let  $Y = 2X_1 + X_3$ 

- 1)  $Y \sim N(60,10)$       2)  $Y \sim N(70,13)$       3)  $Y \sim Bin(70,0.13)$   
 4) None of the above

(3)  $E(X_2)$  is equal to

- 1) 10      2) 2      3) 0.2      4) None of the above

(4) Let  $Y = 3X_5$ . Then  $E(Y)$  is equal to

- 1) 30      2) 3      3) 10      4) None of the above

(5)  $Pr(X_1 < 8)$  is equals to

- 1) 0.0228      2) 0.9772      3) 0.5      4) None of the above

From questions (6) to (10) state whether the given statement is "True" or "False". Write your answer in the relevant box.

(6) Normal distribution is a discrete distribution.

(7) If  $X \sim \text{Bin}(n, p)$  then if  $np > 5$  and  $np(1-p) > 5$  distribution of  $X$   
can be approximated by  $X \sim N(np, np(1-p))$

(8) Let  $X \sim N(10, 1)$  then  $\Pr(X < 8) = \Pr(X > 12)$

(9)  $Z \sim N(0, 1)$   $\Pr(Z \geq 0) \neq \Pr(Z \leq 0)$

(10) Student - t distribution is a positively skewed distribution

50 Marks

2.

A machine produces components of mean diameter 1.35cm and standard deviation 0.05cm. The diameters are assumed to be normally distributed. Suppose that all components with diameters outside the range 1.25 to 1.45 are rejected.

- (i) What proportion of components will be rejected in a batch of production?
- (ii) Suppose that 10 production items are checked. Find the probability that two production items will be rejected out of checked 10 production items.
- (iii) Suppose that 200 production items are checked. Find the probability that 20 to 50 production items will be rejected out of checked 200 production items.

50 Marks