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**GARISSA UNIVERSITY**

**UNIVERSITY EXAMINATION 2018/2019 ACADEMIC YEAR TWO**

**SECOND SEMESTER EXAMINATION**

**SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES**

**FOR THE DEGREE OF BACHELOR OF EDUCATION**

**COURSE CODE: STA 212**

**COURSE TITLE: MATHEMATICAL STATISTICS 1**

**EXAMINATION DURATION: 2 HOURS**

**DATE: 07/02/2020 TIME: 2.00-4.00 PM**

**INSTRUCTION TO CANDIDATES**

* **The examination has FIVE (5) questions**
* **Question ONE (1) is COMPULSORY**
* **Choose any other TWO (2) questions from the remaining FOUR (4) questions**
* **Use sketch diagrams to illustrate your answer whenever necessary**
* **Do not carry mobile phones or any other written materials in examination room**
* **Do not write on this paper**

**This paper consists of FOUR (4) printed pages *please turn over***

**QUESTION ONE (COMPULSORY)**

1. Let X and Y have the joint probability distribution described below

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| (*x , y*) | (0,0) | (0,1) | (1,0) | (1,1) | (2,0) | (2,1) |
|  |  |  |  |  |  |  |

, and , elsewhere

1. Find the marginal p.d.f of X and Y
2. Find the conditional pdf of X given Y= *y* i.e*.*
3. Find the conditional mean of X given
4. Find the conditional variance of X given

(10 marks)

1. Let X and Y have a bivariate normal distribution with the following parameters

,

Determine

1. (2 marks)
2. (5 marks)
3. Let X be a continuous random variable with the following probability density function:

for 0 < x < 1, and zero elsewhere.

What is the probability density function of Y=X2? (5 marks)

1. Let X and Y have joint probability mass function given by:

1. Show that is a joint probability mass function. (2 marks)
2. Find the ( 6 marks)

**QUESTION TWO**

1. Let X and Y be jointly distributed with the p.d.f shown below

elsewhere  
Find

1. the marginal p.d.f of X
2. the conditional distribution of Y given
3. the conditional mean of Y given
4. the conditional variance of Y given

(12 marks)

1. The joint distribution of X and Y is given by:

1. Find the marginal p.m.f of X and Y (4 marks)
2. Are X and Y independent? Explain (4 marks)

**QUESTION THREE**

The joint moment generating function of random variables X1 and X2 is given by:

1. Find the marginal moment generating function of X1 and X2
2. Are X1 and X2 independent? Explain.
3. Find and
4. Find and
5. Find the correlation coefficient between X1 and X2  (20 marks)

**QUESTION FOUR**

1. Let X and Y have a joint p.d.f given by:

Determine:

1. and (5 marks)
2. and (5 marks)
3. (3 marks)
4. the correlation coefficient between X and Y. (2 marks)
5. Assume that in a certain population of married couples, the height of husbands (X) and the height of wives (Y) have a normal distribution with parameters.

, ,

Determine the probability that the height of a wife is between 5.28 and 5.92 feet given that the husband is 6.3 feet tall. (5 marks)

**QUESTION FIVE**

1. Let X and Y be jointly distributed random variables with joint probability distribution given by

Obtain the joint moment generating function of X and Y, hence show that X and Y are not independent. (15 marks)

1. Let the p.d.f of X be given by:

, elsewhere

Given that , Find:

1. the distribution function of Y
2. the density of Y (5 marks)