



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**SCHOOL OF MATHEMATICS AND ACTUARIAL SCIENCE**

**UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR OF SCIENCE**

**ACTUARIAL**

**SPECIAL RESIT 2020/2021 ACADEMIC YEAR**

**REGULAR (MAIN)**

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**COURSE CODE: SAS 202**

**COURSE TITLE: Principles of Statistical Inference**

**EXAM VENUE:**

**STREAM: (BSc. ACTUARIAL SCIENCE)**

**DATE:**

**EXAM SESSION:**

**TIME: 2.00 HOURS**

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**Instructions:**

- 1. Answer question 1 (Compulsory) and ANY other 2 questions**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

**QUESTION ONE (30 MARKS)**

- a) Use the standard normal evaluate the following
- i)  $p(-1.72 < z < 2.31)$  (3 marks)
  - ii)  $p(|z| < 2.03)$  (3 marks)
- b) The masses of students are normally distributed with standard deviation 17. If 4.2% of the students have a mass above 110 kg, find the mean mass and also the number of students in a class of 300 who have a mass below 78. (6 marks)
- c) The maximum load that a lift can carry is 450kg. The weights of men are normally distributed with mean 60kg and standard deviation 10kg. The weights of women are normally distributed with mean 55kg and standard deviation 5kg. Find the probability that the lift will be overloaded by five men and two women. (6Marks)
- d) By doing a box plot, identify outliers in the following data;  
1,3,7.8,8.5,9,9,12,14,7,1,4,8,16,8,7,9,10,13,7,6,8,11,17,7 (6 Marks)
- e) Use the sequence of random digits 6754908006324650 to generate four simulated observations from the binomial  $n = 8$  ,  $p = 0.3$  (6 Marks)

**QUESTION TWO (20 MARKS)**

- a) A student is studying the height of a particular plant. It is known that the height follows a normal distribution with mean  $\mu$  and variance  $\sigma^2$ . He selects 15 plants at random, measures their height and calculates that the mean height of the sample is 12.2 cm and the standard deviation is 1.4 cm. Using these values, calculate a 90% confidence interval for  $\mu$ . Calculate also the width of this interval. (10 marks)
- b) Use the sequence of random numbers 6789 3456 8976 9502 to take a random sample of size 4 from a Poisson distribution with variance 4. (10 marks)

**QUESTION THREE (20 MARKS)**

- a) The management of an insurance company was evaluating the performance of the company's workers. Out of 600 employees, 540 scored less than 69% in the evaluation while 18% scored 75% and better.
- i) Given that the scores fitted a normal distribution, determine the mean and standard deviation of the scores to the nearest whole number. (5 Marks)
  - ii) Determine the pass mark in this evaluation if 60% of the employees were awarded a pass in the exercise. (4 Marks)
  - iii) Determine how many employees were awarded an excellent report if the minimum evaluation mark for excellence was 72% (4 Marks)
- b) The discrete random variable X is such that  $\sim B(5,0.4)$  . Take a random sample of size 7 from this distribution using the random numbers 308 423 112 901 355 283 002 (7 Marks)

**QUESTION FOUR (20 MARKS)**

- a) Thirty random observations are taken from each of the following distribution and the sample mean calculated. Find, in each case, the probability that the sample mean exceeds 5.
- i)  $X$  is the number of telephone calls made in an evening to a counseling service, where  $X$  is Poisson with parameter  $\lambda = 4.5$  (4 Marks)
  - ii)  $X$  is the number of heads obtained when an unbiased coin is tossed nine times (4 Marks)
  - iii)  $X$  is uniformly distributed in the range  $2 \leq X \leq 7$  (5 Marks)
- b) A and B play a game of heads and tails, each tossing 50 coins. A will win the game if he tosses 5 or more heads than B, otherwise B wins. Determine the odds against A winning any particular game. (7 Marks)

**QUESTION FIVE (20 MARKS)**

- a) Distinguish between correlation and regression using any three factors (6 marks)
- b) Obtain the regression equations of age on blood pressure and blood pressure on age hence estimate the blood pressure when age is 50 given

Age (X)	56	42	36	63	47	55
Blood Pressure (Y)	147	125	118	149	128	150

(14marks)