



# MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

THIRD YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF ECONOMICS AND STATISTICS

BACHELOR OF ECONOMICS

EES 301: STATISTICS FOR ECONOMISTS II

DATE: 23/3/2021

TIME: 8.30-10.30 AM

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## INSTRUCTIONS:

- (i) Answer question one (Compulsory) and any other two questions
- (ii) Do not write on the question paper
- (iii) Show your working clearly
- (iv) Where  $\alpha$  has not been given, use  $\alpha=0.05$

## QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Explain the following terms while giving examples as applied in statistics (8 marks)
  - i. Uniform probability distribution
  - ii. Continuous probability distribution
  - iii. A random variable
  - iv. Discrete probability distribution
- b) Recall that a sampling distribution of the sample means is normally distributed if it is taken from a normal population. However, in many instances, the population is not normally distributed. In such cases, we apply the central limit theorem. Explain (2 marks)
- c) The COVID 19 committee in Machakos university plans to install new equipment which will measure temperature and at the same time act as a dispenser for a sanitizer in effort to curb the spread of the pandemic. It has been found that the average dispensing time is 150

seconds, with a standard deviation of 15 seconds. Before they can decide if such an investment would be worth given the students population to be served, they require you to determine the probability that the mean of a sample of 35 students will be:

- i. Between 145 and 150 (2 marks)
- ii. Between 145 and 155 (2 marks)
- iii. Greater than 155 (2 marks)
- d) Using examples, differentiate between a point estimate and an interval estimate. (4 marks)
- e) Explain two characteristics of error term (2 marks)
- f) Explain two types of decision errors in statistics (4 marks)
- g) Assume Machakos level 5 hospital receives on average 6 cases of COVID 19 per day. What is the probability that it will receive 4 COVID 19 cases on any given day? (4 marks)

#### **QUESTION TWO (20 MARKS)**

- a) Describe two scenarios where permutations can be applied (2 marks)
- b) Discuss the characteristics of a good estimator (8 marks)
- c) Explain (use symbols) the difference between mathematical and statistical models (4 marks)
- d) State three characteristics of chi square distribution and highlight three circumstances when it can be applied (6 marks)

#### **QUESTION THREE (20 MARKS)**

- a) Differentiate between descriptive statistics and statistical inference (4 marks)
- b) What do you understand by the term sample distribution of the mean (2 marks)
- c) A supervisor has six workers with the following job experiences; 2, 4, 6, 6, 7, 8 with a mean of 5.5. Four workers are chosen randomly for different shifts and their means of experience recorded.
  - i. Determine the number of shifts (2 marks)
  - ii. Generate the samples and compute their respective means (4 marks)
  - iii. Generate the proportion distribution of the means (2 marks)
  - iv. Calculate the mean and variance (4 marks)

**QUESTION FOUR (20 MARKS)**

- a) State any two characteristics of probabilities (2 marks)
- b) What are the main assumptions about the error term (4 marks)
- c) Discuss the five essential steps or procedures of hypothesis testing (10 marks)
- d) State the significance of the error term (4 marks)

**QUESTION FIVE (20 MARKS)**

- a) A random sample is distributed about the mean,  $\mu$  with a variance of 48mm. A random sample of 13 observations taken in the past gave a sample variance of 52mm. Can this outcome be attribute to chance or can it be taken as evidence that variability has risen? (10 marks)
- b) A census of counties in Kenya in particular month in 2020 revealed that the mean monthly COVID 19 cases were 250. A random sample of 16 counties taken in the following month had mean monthly COVID 19 cases of 266 and a standard deviation of Kshs 48. Can we conclude that the mean monthly COVID 19 cases had increased since census? (10 marks)