



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF BUSINESS
DEPARTMENT OF MANAGEMENT SCIENCE
EXAMINATION ONE FOR:
BACHELOR OF COMMERCE
BMS 4203: ADVANCED BUSINESS STATISTICS
TIME: 2HOURS
DATE: Aug2019

Instructions to Candidates

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions

You should have the following for this examination:

Answer Booklet, examination pass and student ID

QUESTION 1

a) Assume that we are going to toss an unfair coin that has $P(H) = 0.8$ and $P(T) = 0.2$. The events (outcomes) are independent, because the probabilities of all tosses are exactly the same. What is the probability of getting three heads on three successive tosses? **(3 marks)**

b) Consider that Florida Lottery system uses the random selection of FOUR integers from a group of 48 to determine the weekly winner.

i) How many experimental outcomes are possible? **(2 marks)**

ii) What is the chance of an individual who buys a lottery ticket winning? **(2 marks)**

c) An inspector selects 3 of 6 parts to inspect for defects. How many permutations may be selected? **(2 marks)**

d) The following table provides a probability distribution for the random variable y .

y	$f(y)$
2	0.20
4	0.30
7	0.40
8	0.10

- i) Compute $E(y)$
- ii) Compute $\text{Var}(y)$
- iii) Compute the standard deviation of (y) **(6 marks)**

e) Consider a project which yields an average cash flow of Kshs 500 per hour with a standard deviation of Kshs 60 per hour. Calculate the following probabilities:-

- i) Cash flow will be more than Kshs 560 per hour
- ii) Cash flow will be less than Kshs 420 per hour
- iii) Cash flow will lie between Kshs 460 per hour and Kshs 540 per hour.
- iv) Cash flow will be more than kshs 680 per hour. **(8 marks)**

f) i) Differentiate between a NULL hypothesis and ALTERNATIVE hypothesis. **(2 marks)**

ii) A job placement director claims that the average starting salary for nurses is Kshs 24,000. A sample of 10 nurses has a mean of Kshs 23,450 and a standard deviation of Kshs 400. Is there enough evidence to reject the director's claim at $\alpha=0.05$ confidence level.

(5 marks)

QUESTION 2

a) Calculate the value of Chi-square from the following data:-

Class	A	B	C
Observed Frequency	37	44	19
Expected Frequency	31	38	31

(10 mark)

b. What is statistical decision theory?

(1 mark)

c. Explain the differences between decision-making under certainty, risk and uncertainty by giving suitable examples.

(9 marks)

QUESTION 3

a) Past records shows that there were 4 accidents per month at Kibarani in Mombasa. Police are investigating the safety of this dangerous point. The number of accidents is distributed according to a poisson distribution.

Calculate the probability in any month of exactly

- i) 0
- ii) 1
- iii) 2
- iv) 3
- v) 4 accidents **(10 marks)**

b) Draw a Poisson probability distribution to depict the information (include values up to 5 accidents)

(4 marks)

c) Find i) $P(x < 3)$ ii) $P(x > 4)$ iii) $P(x = 8)$ **(6 marks)**

QUESTION 4

a) Identify 3 properties of Normal distributions **(6 marks)**

b) The mean number of hours an Australian worker spends on the Computer is 3.1 hours per workday.

Assume the Standard deviation is 0.5 hour. Find the percentage of workers who spend less than 3.5 hours on the computer. Assume the variable is normally distributed. **(4 marks)**

c) each month, an American household generates an average of 28 pounds of newspapers for garbage or recycling. Assume the standard deviation is 2 pounds. If a household is selected at random, find the probability of its generating

i) between 27 and 31 pounds per month.

ii) More than 30.2 pounds per month

Assume the variable is approximately normally distributed.

(10 marks)

QUESTION 5

The following data are the claims (in millions) for XYZ Insurance Co. benefits for NINE counties; along with the surplus (in millions) that the company had in assets in those states.

<u>COUNTY</u>	<u>CLAIMS</u>	<u>SURPLUS</u>
Mombasa	1,425	277
Kilifi	273	100
Kwale	915	120
T/River	234	40
Kiambu	142	25
Machackos	1,687	259
Makueni	258	57
Kajiado	259	31
Narok	894	141

REQUIRED

Use the data to compute a correlation coefficient, r , to determine the correlation between claims and surplus. **(20 marks)**