



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

FOURTH YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (HOSPITALITY AND TOURISM MANAGEMENT)

HTM 402-4: STATISTICS

DATE: 16/8/2021

TIME: 11:00 – 1:00 PM

INSTRUCTIONS

Answer question ONE and any other TWO questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Explain the meaning of the following terms as applied in Statistics: -
- (i) Statistical estimation (2 marks)
 - (ii) Significance level (2 marks)
- b) Differentiate between EACH of the following terms: -
- (i) Null and Alternative hypothesis (2 marks)
 - (ii) Type I and Type II errors (2 marks)
 - (iii) Point and Interval estimation (2 marks)
- c) In a random sample of 64 customers in a fast moving restaurant, the meaning waiting time for being served is 3 minutes is with a standard deviation of 1.5 minutes. Construct a 99% confidence interval for the average waiting time in the restaurant. (6 marks)
- d) A fire department in a 5-star hotel keeps track of the number of false alarms revived over a period of one week

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
22	12	15	8	14	27	35

At the $\alpha=0.01$ level of significance, test if there is any difference in the number of calls received based on the day of the week (6 marks)

- e) Determine the values of a, b, c, d, e from the following ANOVA Table

	Sum of Squares	Degrees of Freedom	Mean Squares	F-Ration
Factor	205	b	c	e
Error	a	16	d	
Total	287	19		

(5 marks)

- f) Given that $H_0: \mu = 100$, $H_a: \mu > 100$, $n = 64$, $\bar{x} = 110$, $s = 40$, test the null and alternate hypothesis at a significance of $\alpha = 0.05$.

(3 marks)

QUESTION TWO (20 MARKS)

- a) At a large departmental store, the average amount of all sales is \$78. On a special holiday promotion day, the total purchase amount of 80 different randomly selected sales has a mean of \$92 with a standard deviation of \$62. Test if the mean sale amount on a promotion day is higher than on a regular day at the $\alpha = 0.1$ significance level. (7 marks)
- b) A survey is conducted among workers in a certain Tour company to determine if there is any difference between proportions of women, men who drive, take a bus, or take a train to work. The results are as shown below:

	Drive	Bus	Train
Women	25	100	125
Men	75	120	205

- (i) State the null and alternative hypothesis. (1 mark)
- (ii) Construct the corresponding cross-tabular contingency table for the expected frequencies. (6 marks)
- (iii) Test whether there is any difference in the proportions using the different modes of transport based on gender at $\alpha = 0.01$ level of significance.

(6 marks)

QUESTION THREE (20 MARKS)

- a) A 3-star Hotel is interested in analyzing the effects of advertising on its sales Over a five week period as shown below:

Money spend on advertising	5	8	10	15	22
Total sales	6	15	20	30	39

Use the data to determine correlation coefficient between the total sales and the money spend on advertng. (8 marks)

- b) Given the following set of data construct the ANOVA table and compare the F value calculated with the critical value at $\alpha=0.05$ level of significance

A	B	C
15	18	6
10	20	15
15	22	10

(12 marks)

QUESTION FOUR (20 MARKS)

- a) A large tour company finds that the typical office worker spends an average of 13 minutes per hour on non-work related activities. On trial basis, management sets up new enclosed work station for a randomly selected group of 12 workers and finds that the average number of minutes lost per hour is 11.3 with a standard deviation of 3.7. At 5% level of significance, can one conclude that the new work stations represent a significant change (8 marks)
- b) A supermarket owner is studying how the average waiting time in minutes for customer checkout depends on the number of checkout clerks working as shown below

Checkout clerk	3	4	5	5	6	7
Waiting time	9	6	6	4	2	1

- i) Determine the linear regression equation for waiting time as a function of the number of clerks on duty. (10 marks)
- ii) Use the equation on (i) above to predict the most likely waiting time for 9 checkout clerks (2 marks)

QUESTION FIVE (20 MARKS)

- a) Two waiters in a hotel are being compared to see whether one serves consistently more customers over the course of an hour. The supervisor collects the following data on the number of customers each waiter serves in the course of 1 hour periods.

Craig	13	15	18	11	14	16	24	16	13	8	13	16	12	13
Ken	11	11	14	15	14	12	16	14	19	12	15	13	11	14

Based on this data, does Craig usually serve more customers per hour than Ken at the $\alpha = 0.05$ level of significance? (8 marks)

- b) A student has a choice of driving to college either by a highway (which is often clogged with traffic during morning rush hours) or by back roads. Over the course of several weeks, he tries both routes and times his trip takes. the following is the set of data for the number of minutes the trip takes

A (Highway)	34	28	46	42	56	85	48	25	37	49
B (back roads)	43	49	41	55	39	45	65	50	47	51

Use the rank-sum test to determine if there is any difference in the average time for his commute at the 5% level of significance (12 marks)