UNIVERSITY OF FORT HARE

HST 221

SUPPLEMENTARY EXAMINATIONS

JANUARY 2019

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Time: 3Hours

Subject: Social Statistics II

Mark: 100

This paper consists of 5 pages including the cover page

Internal Examiners

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INSTRUCTIONS

- Answer ALL questions
- Statistical Tables will be provided.

HST 221

SUPPLEMENTARY EXAMINATIONS

QUESTION 1

1.1 An HR manager claims that the mean weekly salary of a certain category of workers is R1200. A shop steward randomly selects 50 workers in this category and calculates that the mean weekly salary is R1138 with a standard deviation of R275. Can the shop steward conclude the mean weekly salary of workers in the category under discussion is significantly different from R1200? Test at the 5% level of significance. Based on the conclusion reached, what type of error is possible, type I or type II? [10]

1.2 Draw a scatter diagram showing the following relationship between two variables:

1.2.1 Positive linear relationship. [2]

1.2.2 Negative linear relationship. [2]

1.2.3 No linear relationship. [2]

1.3 A biologist has mixed a spray designed to kill 50% of a certain type of insect. If a spraying of such 200 such insect killed 120 of them, test at the 2% level of significance whether the percentage of insect killed is significantly different from 50% [9]

.....**[25mks]**

QUESTION 2

In each of the following, decide whether the test to be conducted is one- tailed or two-tailed and set the hypotheses in each case:

2.1 A large retailer wants to decide whether the mean income of certain families exceeds R14000 and designs a test to see whether this is so.[5]

2.2 According to specifications, the mean time required to inflate a rubber life raft is 8,5 seconds. A shipment of such rafts is to be tested to see whether specifications are met.[5]

2.3 A police chief claims that the mean age of armed robbers is 19,5 years. A researcher worker feels that this figure is too low, and designs a test to find out if her suspicions are correct.[5]

2.4 Pilltex Pharmaceutical have developed a new headache tablet and they want to test to see Whether the proportion of consumers who rate their product as effective is greater than 70% .[5]

2.5 State and define the two types of error committed during decision making. [5]

.....[25mks]

QUESTION 3

3.1 Ten varieties of coffee labelled A, B, C, . . . , J were tasted by a man and a woman. Each ranked the coffee from best to worst as shown.

Man:	G	H	C	D	A	E	B	J	I	F
Woman:	C	B	H	G	J	D	I	E	F	A

Find Spearman's rank correlation coefficient. [12]

3.2 A survey was carried out to determine whether there is a relationship between gender of students and performances in a test conducted on HST 221.The following is called a Crosstabs table, using the observed frequencies from the recoded data (Pass = score 70 or above):

	Pass	No Pass	Row totals
Males	12	3	15
Female	13	2	15
Column Totals	25	5	30

Perform a Chi-square test to investigate the intention of the investigators. Test at the 5% level of significance.[13]

.....**[25mks]**

QUESTION 4

An entrepreneur considering investing in the floral industry wishes to research the relationship between farm size(in hectares) and revenue generated per hectare (in R100 000's). He randomly selected 8 farms and obtained the following data:

Size(hectares)	Revenue(R100 000's)
52	5,6
55	5,7
57	5,4
60	6,1
63	6,1
68	6,3
71	6,4
74	6,2

Given also for this data are: $\bar{x} = 62{,}5$ $\bar{y} = 5{,}975$

4.1 Calculate the Pearson correlation coefficient, *r* and interpret your result.[13]

4.2 Determine the coefficient of determination.[2]

4.3 Use the least square regression line to estimate the revenue generated by a farm of:

4.3.1 55 hectares. [3]

4.3.2 80 hectares.[3]

4.4 Which estimate in 4.3 is likely to be more accurate? Give a reason for your answer.[2]

4.5 Which estimate in 4.3 is referred to as "extrapolated"? Give a reason for your answer.[2]

.....**[25mks]**