



KISII UNIVERSITY

UNIVERSITY EXAMINATIONS

THIRD YEAR EXAMINATION FOR THE AWARD OF THE DEGREE OF BACHELOR OF SCIENCE IN NURSING

FIRST SEMESTER, 2021/2022

(FEBRUARY - JUNE, 2022)

NUR 301: BIostatISTICS

STREAM: Y3 S1

TIME: 3 HOURS

DAY: THURSDAY, 2:00 – 5:00 P.M.

DATE: 05/05/2022

INSTRUCTIONS:

- 1. Do not write anything on this question paper.***
- 2. Question ONE and TWO are compulsory. Choose any other two from the remaining.***

SECTION A(20MARKS)

1. Which statement is true among the following: The 95% confidence interval for the mean:

- Contains the sample mean with 95% certainty.
- Is approximately equal to the sample mean plus and minus two standard deviations
- Contains 95% of the observations in the population.
- Can be used to give an indication of whether the sample mean is a precise estimate of the population mean.

2. Cancer has four stages labeled as stage 0, I, II, III, IV. Which scale of measurement does this classification falls?

- Scale
- Numerical
- Ordinal
- Nominal

3 The characteristics or quantity of individual that keeps on changing from one individual to another is

- a) Static group
- b) Variable
- c) Dynamic group
- d) Dynamism

4. The probability of occurrence of an event is 0.21. What is the probability that it does not occur?

- A -0.79
- B 0.11
- C 0.79
- D 0.80.

5. The average of a series of numerical values is:

- A. The sum of the values divided by their number
- B. Lower than the minimum value in the series
- C. Lower than the maximum value in the series
- D. An indicator of central tendency for the values of the series

6. Which statement is true for the standard normal distribution?

- A Its density function has a maximum at 1.
- B. Its expected value and theoretical standard deviation are equal to each other.
- C Its expected value is 1.
- D. Its expected value is 0.

7. We tested an anticancer medicine. The result of the paired t-test is $t=0$, so

- A. We reject the null-hypothesis, so there is no effect.
- B. We measured practically the same before and after the treatment.
- C Because $t = 0$ then p is zero, so the drug is effective.
- D We accept the null-hypothesis, so the drug has effect

8 The most fundamental statistical indicators of describing averages is:

- A. Mean
- B. Median
- C. Variance
- D. Standard deviation

9. Which central tendency fits for characterizing random variables measured on ordinal scale?

- A only the mean and the median
- B only the median
- C only the mode and the median
- D only the mode and the mean

10 Relative risk:

- A. Shows the relationship between a factor assumed to influence the occurrence of disease, and the disease
- B is the ratio of the risk of disease for those exposed and those not exposed to that risk factor
- C. Cannot be greater than 1

D. is expressed as a percentage

11 The probability that the patient coming to our class has viral infection is 0.51. The probability of the occurrence of flu infection at our class is 0.1. What is the probability that the patient has flu, IF we know that this patient has viral infection?

A.19.61%.

B.5.1%.

C.0.459

D. 0.049.

12 .The use of inferential statistics permits the researcher to:

a) Generalize to a population based on information gathered from a sample

b) Interpret descriptive statistics

c) Describe information obtained from empirical observation

d) Repeat the null hypothesis to Select a level of significance

13. A study is conducted to compare the efficacy of two medications (Drug A and Drug B) for the treatment of hypertension. One hundred patients are enrolled in the study (50 receiving Drug A and 50 receiving Drug B). Which of the following terms BEST describes patients receiving the study medications?

a) Population

b) Sample

c) Experimental group

d) Control group

14. What is NOT the requirement for a good estimation?

A. A good estimation should be consistent.

B. A good estimation should be efficient.

C. A good estimation should be unbiased.

D. A good estimation should be unpredictable.

15.is a listing which is actually a collection of all sampling units?

A.Sampling frame

B. Sample

C. Elementary unit

D. Sampling unit

16. Find the mode of the call received in a health facility on 7 consecutive days

11,13,13,17,19,23,25

A 11

B13

C17

D23

17. Poisson distribution is applied for

A. Regular Random Variable

B. Constant time function

C. Discrete Random Variable

D. Irregular Random Variable

18. Calculate the range of the given sets of data 7,47,8,42,47,95,42,96,2

A 6

B. 94

C.71

D.84

19. Which of the following cannot be the probability of an event?

(A)0.0

(B)0.3

(C)0.9

(D) 1.2

20. Which test is applied to Analysis of Variance (ANOVA)?

(A)t-test

(B)z-test

(C)F-test

(D) χ^2 test

SECTION B (40 MARKS)

1. Define the following terms as used in statistics: (5marks)
 - i. Level of Significance
 - ii. Probability space
 - iii. Observational study
 - iv. Inferential Statistics
 - v. Placebo
2. The weight of patients attending clinic at Kisii Referral Hospital is normally distributed with mean of 70 kgs and standard deviation of 5 kgs. (6marks)
 - i) Approximate what proportion of patients heavier than 73 inches
 - ii) Calculate the proportion of patients between 72 inches and 73 inches
 - iii) Calculate the weight corresponding to 20% of the patients
3. A test is conducted which is consisting of 20 lab samples with each lab sample having four options out of which only one is correct. Determine the probability that a clinician undertaking the test as given exactly five questions wrongly? (5marks)
4. a. What is bias? (2 marks)
b. Suggest some methods we might use to avoid bias in a clinical study (2 marks)
5. Differentiating a case control study from case study(2 marks)
6. In the following examples, identify the response variable and the explanatory variables indicating its level of measurement in each (8 marks)

- a. Attitude toward gun control (favor, oppose), Gender (female, male), Mother's education (high school, college).
 - b. Heart disease (yes, no), Blood pressure, Cholesterol level.
 - c. Race (white, Black), Religion (Catholic, Jewish, Protestant), Vote for president (Democrat, Republican, Other), Annual income.
 - d. Marital status (married, single, divorced, widowed), Quality of life (excellent, good, fair, poor).
7. Why will you prefer to study a sample as opposed to a population (5marks)
8. Highlight five areas in nursing where biostatistics plays a crucial role in supporting decision marking (5marks)

SECTION C (40 MARKS) Answer any 2 questions

QUESTION ONE (20 MARKS)

(a)i) The following table shows how two dentists categorized patients into those having bad halitosis and those who did not. How well do the two dentists agree in their diagnosis? (10 marks)

		Dentist 2		
		Halitosis	Healthy	Total
Dentist 1	Halitosis	15	12	27
	Healthy	8	65	73
	Total	23	77	100

ii) A new treatment has been developed which claims to prevent halitosis. 100 halitosis sufferers were divided randomly into two groups. 50 patients received the new treatment and 50 patients received a placebo. At the end of the trial (four weeks) they were examined by dentist 1 to see if they had halitosis. The results were analysed using a χ^2 test and there was found to be a significant association between the new treatment and lack of bad breath ($P = 0.002$). (The treatment group had less halitosis sufferers). Does this result prove that new treatment prevents halitosis? (Explain your answer)

b) Births in Kisii Referral Hospital occur randomly at an average rate of 1.8 births per hour. (10 Marks)

- i) What is the probability of observing 4 births in a given hour at the hospital
- ii) What is the probability of observing at least 2 births in a given hour
- iii) What is the probability of not observing any birth in an hour
- iv) State three assumptions you made in the above case

QUESTION TWO(20 MARKS)

a) A researcher is investigating the effectiveness of a health education program for patients as moderate to severe dental disease. One of the aims of the program is to effect a reduction in the pocket depths of the patients who are trained in the program. Pilot data seems to suggest that smokers and non-smokers show a different response in this respect. The researcher wants to set up a study that will be able to tell her if the difference in pocket depth reductions between smokers and non-smokers is 0.25mm or more

- i) State the hypothesis the researcher will use (4marks)
- ii) Why will the research opt for sample as opposed to census (6marks)
- iii) Explain the sample design that will be effective in this study (3marks)
- iv) Which statistical analysis will the researcher use? Explain (5marks)

- v) State two methods that can be used to present the findings
(2marks)

QUESTION THREE (20 MARKS)

a) The blood pressure and ages of 7 hospital patients are shown in the table below?

Patient	1	2	3	4	5	6	7
Time	42	74	48	35	56	26	60
Blood pressure	98	130	120	88	182	80	135

Required:

- i) Calculate the product moment correlation coefficient for the data and interpret the result (4marks)
- ii) Find the regression line of blood pressure on time and interpret the result (6marks)
- iii) Estimate the blood pressure for 40 years old patients (3marks)
- iv) What are the assumptions of using product moment correlation (3marks)

c) Distinguish between continuous and discrete data giving example in each (4marks)

QUESTION FOUR (20 MARKS)

a) A study was conducted to determine whether physical exercises alleviate depression. Depressed persons were randomly selected and allocated to one of three groups: No exercise, 20 Minutes jogging per day and 60 minutes jogging per day. At the end of the month each participant was asked to rate how depressed they felt on a scale of 1-100. Data is presented below

No exercise	Jogging for 20 minutes	Jogging for 60 minutes
23	22	59
26	27	66

31	39	38
49	29	49
58	46	56
37	48	60
29	49	56
44	65	62

Use Krustal Wallis to determine whether the differences between the groups are so large that they are unlikely to have occurred ($\alpha=0.05$)

(12MKS)

b) The following ANOVA results was obtained from the SPSS software

ANOVA

	Sum of Square	Degrees of Freedom(d.f)	Mean sum of square	F	sig
Between the Groups	91.467	2			0.021
Within the Groups	276.4	27			
Total					

Required:

- i) Fill in the missing values (4marks)
- ii) Interpret the results given hypothesis that $\mu_1=\mu_2=\mu_3= \mu_4$ (4marks)