



AMREF INTERNATIONAL UNIVERSITY
SCHOOL OF MEDICAL SCIENCES
DEPARTMENT OF REHABILITATION MEDICINE
BACHELOR OF SCIENCE IN PHYSIOTHERAPY

END OF TRIMESTER EXAMINATIONS JANUARY TO APRIL 2025

UNIT CODE: PHT 315

UNIT NAME: Biostatistics (Special exam/upgrading)

DATE: 17th APRIL 2025

TIME:

INSTRUCTIONS

1. All students will have two (2) hours to complete the examination
2. This is an online exam, Attempt all questions as per the instruction
3. It is the student's responsibility to report any page and number missing in this paper.
4. Check that the paper is complete
5. Total number of pages is 6 including the cover.
6. Read through the paper quickly before you start.
7. Upon finishing the exam paper, on submission, the message 'Your examination has been submitted' will appear.

TOTAL: _____/70

PERCENT: _____/100%

POINTS EARNED TOWARDS FINAL GRADE _____/70

SECTION A-MULTIPLE CHOICE QUESTION. Answer all the question (20 MARKS)

1. What does the variance measure in a dataset?
 - A. The average of the data values
 - B. The spread of data around the mean
 - C. The highest value in the dataset
 - D. The most frequently occurring value
2. When we make a 95% confidence interval for the population mean using t or z test then probability or chance of error will be;
 - A. 0.05
 - B. 0.1
 - C. 1
 - D. 5
3. A variable which has some chance or probability of its occurrence is known as;
 - A. Simple variable
 - B. Qualitative variable
 - C. Quantitative variable
 - D. Random variable
4. In probability theory, what is the sum of all possible probabilities of a single event?
 - A. 0
 - B. 1
 - C. 0.5
 - D. Infinite
5. What type of data is represented in a pie chart?
 - A. Numerical data
 - B. Categorical data
 - C. Both categorical and numerical data
 - D. None of the above
6. What is the median of the dataset {2, 5, 8, 12, 14}?
 - A. 5
 - B. 8
 - C. 12
 - D. 14
7. What is the first step in hypothesis testing?
 - A. Calculating the p-value
 - B. Stating the null and alternative hypothesis
 - C. Collecting data
 - D. Rejecting the null hypothesis
8. The probability of rolling a 3 on a fair six-sided die is:
 - A. $1/6$
 - B. $1/3$
 - C. $1/2$
 - D. $1/4$
9. A normal distribution is fully defined by which two parameters?
 - A. Mean and mode
 - B. Median and variance
 - C. Mean and standard deviation

- D. Mode and range
10. Which of the following is NOT an assumption of the normal distribution?
- A. The data is symmetrically distributed
 - B. The mean, median, and mode are equal
 - C. It applies only to small datasets
 - D. It follows a bell-shaped curve
11. The mean of a dataset is also called the:
- A. Measure of dispersion
 - B. Measure of variability
 - C. Measure of central tendency
 - D. Measure of probability
12. The sum of the deviations of each data point from the mean in a dataset is always:
- A. Positive
 - B. Negative
 - C. Zero
 - D. Equal to the standard deviation
13. What is the term for a variable that can take on an infinite number of values within a given range?
- A. Categorical variable
 - B. Discrete variable
 - C. Continuous variable
 - D. Ordinal variable
14. Which of the following best describes the chi-square test?
- A. A test for differences in means between two groups
 - B. A test for categorical data relationships
 - C. A test for normality
 - D. A test for variance equality
15. In a positively skewed distribution, which measure of central tendency is the highest?
- A. Mean
 - B. Median
 - C. Mode
 - D. They are all equal
16. The coefficient of variation is expressed as a:
- A. Whole number
 - B. Fraction
 - C. Percentage
 - D. Decimal value
17. The larger the sample size, the:
- A. Higher the variability
 - B. Lower the standard error
 - C. Lower the mean
 - D. Less accurate the estimate
18. If the probability of an event occurring is 0.2, what is the probability of the event NOT occurring?
- A. 0.8
 - B. 0.6

- C. 0.4
 - D. 0.2
19. The standard normal distribution has a mean of:
- A. 1
 - B. 0
 - C. 100
 - D. -1
20. In a study, the dependent variable is:
- A. The variable being manipulated
 - B. The variable that responds to changes in the independent variable
 - C. Always categorical
 - D. Not relevant in hypothesis testing
21. The p-value in hypothesis testing represents:
- A. The probability of making a Type II error
 - B. The probability of observing the data given that the null hypothesis is true
 - C. The probability of the alternative hypothesis being true
 - D. The mean of the data
22. Which of the following is NOT a measure of dispersion?
- A. Range
 - B. Variance
 - C. Mean
 - D. Standard deviation
23. A Type I error occurs when:
- A. The null hypothesis is accepted when it is false
 - B. The null hypothesis is rejected when it is true
 - C. The sample size is too large
 - D. The p-value is exactly 0.5
24. Chi-square test of significance is used when;
- A. Data is continuous
 - B. Data is categorical
 - C. Data is discrete
 - D. None of these
25. Which of the following is a discrete probability distribution?
- A. Normal distribution
 - B. Binomial distribution
 - C. Exponential distribution
 - D. Uniform distribution
26. The mean and standard deviation of a dataset can be used to determine:
- A. The correlation coefficient
 - B. The shape of the distribution
 - C. The p-value
 - D. The confidence interval
27. What is the probability of selecting an ace from a standard deck of 52 playing cards?
- A. $1/52$
 - B. $4/52$
 - C. $13/52$

- D. 2/52
28. The Wilcoxon signed Rank-Sum test used to compare the location of?
- Two populations
 - Three Population
 - A sample mean to the population mean
 - Any number of populations
29. . Which sampling technique involves selecting the first participant and then recruiting others through referrals?
- Cluster sampling
 - Systematic sampling
 - Snowball sampling
 - Stratified sampling
30. The interquartile range (IQR) measures:
- The range of all data values
 - The middle 50% of data
 - The variance of data
 - The standard deviation

SECTION B –SHORT ANSWER QUESTIONS (20 MARKS) Answer all questions.

1. A measurement of Amref class weight has a normal distribution with a mean of 75 and a standard deviation of 10. Find the probability that a randomly selected value from this distribution is greater than 85. (5 Marks)
2. A researcher conducts a hypothesis test to determine if the average weight of Mothers in an Obese clinic is 150 Kg. A random sample of 36 mothers has a mean weight of 155kg with a standard deviation of 12g. Test the hypothesis at a 0.05 significance level. (5 Marks)
3. An Optometry factory produces reading glasses with a defect rate of 2%. If a random sample of 10 reading glasses is selected, calculate the probability that exactly one reading glass is defective using the binomial distribution formula. . (5 marks)
4. Construct a frequency distribution table for the following dataset: {12, 15, 14, 13, 16, 12, 15, 17, 14, 15} and create a corresponding histogram. (5 marks)

SECTION C –LONG ANSWER QUESTIONS (20 MARKS) Choose one question

1. The following are data of Blood sugar levels of 16, Men attending Diabetic clinic.
8, 18, 11,9,13,16 15, 19, 11, 13, 10, 6, 7, 4, 5, 9 (20 Marks)
 - a) Calculate the: Mean, Median, Variance and Standard deviation. (8 Marks).
 - b) Calculate Q1 and Q3 (4 Marks)
 - c) Construct a boxplot (4 Marks)
 - d) Plot a frequency polygon (4 Marks)
2. Suppose we want to know whether or not three different nutritional diet lead to different mean weight on infants. To test this, we recruit 30 infants to participate in a study and

split them into three groups. The infants in each group are randomly assigned to use one of the nutritional diet for the next three months. At the end of the three months, all of the infants' weights are taken. (20 Marks)

The weights for each group are shown below:

Group 1/Diet 1	Group 2/Diet 2	Group 3/Diet
8.5	9.1	7.9
8.6	9.2	7.8
8.8	9.3	8.8
7.5	8.5	9.4
7.8	8.7	9.2
9.4	8.4	8.5
9.8	8.2	8.3
7.9	8.8	8.5
7.1	9.5	8.2
8.0	9.6	8.1

Use the following steps to perform a one-way ANOVA by hand to determine if the mean weight is different between the three groups/Diets:



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Ztable.pdf