AMREF INTERNATIONAL UNIVERSITY
SCHOOL OF PUBLIC HEALTH
DEPARTMENT OF HEALTH SYSTEMS AND COMMUNITY HEALTH
BACHELOR OF SCIENCE /HEALTH SYSTEMS
END OF JANUARY-APRIL 2023 SEMESTER EXAMINATIONS

UNIT CODE: CHP 211/HMD 133

UNIT NAME: BIOSTATISTICS

DATE: 19th April 2023

TIME: TWO HOURS

START: 4.00 PM FINISH: 6:00 PM

INSTRUCTIONS (physical exams)

1. **Do not write on this question paper**

INSTRUCTIONS (Online examinations)

1. This exam is marked out of 70 marks
2. This Examination comprises of two Sections
3. This exam shall take TWO hours

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SECTION A: ANSWER ALL QUESTIONS 30 MARKS

1. Using an example, describe an a non-representative sample (4 Marks)

2. Name the type of data for each of the following; (5 Marks)

    a. Patients gender
    b. Number of languages a person speaks
    c. Weight of cars
    d. Pain associated with cancer
    e. No of cigarettes smoked per day by a person

3. The duration of time from first exposure to HIV infection to AIDS diagnosis is called the incubation period. The incubation periods of a random sample of 7 HIV infected individuals is given below (in years):

    12.0, 10.5, 9.5, 6.3, 13.5, 12.5, 7.2

a. Calculate the sample mean (1 Mark)
b. Calculate the sample median. (1 Mark)
c. Calculate the sample standard deviation. (2 Marks)
d. If the number 6.3 above were changed to 1.5, what would happen to the sample mean, median, and standard deviation? State whether each would increase, decrease, or remain the same (3Marks)

4. Assume blood-glucose levels in a population of adult women are normally distributed with mean 90 mg/dL and standard deviation 38 mg/dL.

a. Suppose the "abnormal range" were defined to be glucose levels outside of 1 standard deviation of the mean (i.e., either at least 1 standard deviation above the mean, or at least 1 standard deviation below mean). Individuals with abnormal levels will be retested.

    i. What percentage of individuals would be called "abnormal" and need to be retested? (3 Marks)
    ii. What is the normal range of glucose levels in units of mg/dL? (3 Marks)

5. A drug company is testing a new flue vaccine which is believed to be more effective than the one that is currently used. Of 100 people who used this new vaccine, 10 people got the flu. What is the 95% confidence interval for the proportion of people who would still get the flue if we use this vaccine instead of the old one. (4 Marks)

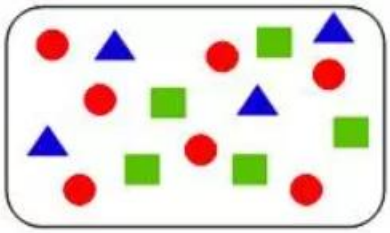
6. A sample of 16 college students asked about time they spent doing their homework. It was found that the average to be 4.5 hours. Assuming normal population with standard deviation 0.5 hours.
   Calculate the point estimate for μ (2 Marks)
   Calculate the at 95% confidence interval for μ (2 Marks)

SECTION B: ANSWER ANY TWO QUESTIONS (40 MARKS)

7. The following table shows three different airlines and the number of delayed or on-time flights form flightstats.com. At 95% Confidence Interval, does on-time performance depend on the airline? (20 Marks)

Airline	Delayed	On-time	Total
Ethiopia Airline	112	843	955
Emirates	114	1416	1530
Kenya Airways	61	896	957
Total	287	3155	3442

8. a) The graphic below shows a container with 4 blue triangles, 5 green squares, and 7 red circles. A single object is drawn at random from the container.



Find the probability that;

i. The object is not a circle (2 Marks)
ii. The object is a triangle (2 Marks)
iii. The object is not a triangle (2 Marks)
iv. The objects is a circle (2 Marks)
v. The object is a square (2 Marks)

b) Brenda a student at AMIU tosses a fair coin three times
   i. What is the probability of three heads (HHH? (2 Marks)
   ii. What is the probability that you observe exactly one head? (3 Marks)
   iii. Given that you have observed at least one heads, what is the probability that observe at least two heads? (5 Marks)

9. In Amref International University, an average of 3 out of every 5 students fetch drinking water within the staff offices. A random sample of 10 students are selected.

   Find the probability that;

i. None will fetch water within the staff offices (5 Marks)
ii. Exactly 6 fetch water within the staff offices (5 Marks)
iii. Less than 6 fetch water within the staff offices (5 Marks)
iv. More than 6 fetch water within the staff offices (5 Marks)