CHUKA UNIVERSITY

UNIVERSITY EXAMINATIONS

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

NURS 393: BIOSTATISTICS

STREAMS: B.Sc (NURS) Y3S1 **TIME: 2 HOURS**

DAY/DATE: FRIDAY 26/03/2021 **2.30 P.M – 4.30 P.M.**

INSTRUCTIONS:

- Answer **ALL** questions
- Do not write anything on the question paper
- This is a **closed book exam**, no reference materials are allowed in the examination room
- **No** use of mobile phones or any other unauthorized materials
- Write your answers legibly and use your time wisely

SECTION A: MULTIPLE CHOICE QUESTIONS [ONE MARK EACH] [20 MARKS]

1. Which of the following is not a measure of central tendency?
   A. Mean
   B. Mode
   C. Range
   D. Median

2. Which branch of statistics deals with the techniques that are used to organize, summarize, and present the data:
   A. Probability Statistics
   B. Inferential Statistics
   C. Descriptive Statistics
   D. Bayesian Statistics

3. The correlation coefficient can range from?
   A. 0 to +1
   B. 0 to -1
   C. -1 to +1
   D. 0 to 100

4. Ranking patients' blood pressure from the lowest to the highest is an example of?
   A. Nominal scale
   B. Ordinal scale
   C. Interval scale
   D. Ratio scale
5. A parameter is a measure that is computed from?
   A. Population data
   B. Sample data
   C. Test statistics
   D. None of the above
6. Statistic is a numerical quantity, which is calculated from:
   A. Population
   B. Sample
   C. Data
   D. Observations
7. If a distribution has two modes then this distribution is called
   A. Uni-Modal
   B. Bi-Modal
   C. Tri-Modal
   D. Multi-Modal
8. If the mean is less than the mode, the distribution will be?
   A. Positively skewed
   B. Negatively skewed
   C. Symmetrical
   D. None of these
9. Individual respondents, focus groups, and panels of respondents are categorised as
   A. Primary data sources
   B. Secondary data sources
   C. Itemised data sources
   D. Pointed data sources
10. The ANOVA procedure is a statistical approach for determining whether or not
    A. The means of two samples are equal
    B. The means of two or more samples are equal
    C. The means of more than two samples are equal
    D. The means of two or more populations are equal

11. The measure of location which is the most likely to be influenced by extreme values in the data set is the;
    A. Range
    B. Median
    C. Mode
    D. Mean

12. The mean of a sample is
    A. Always equal to the mean of the population
    B. Always smaller than the mean of the population
    C. Computed by summing the data values and dividing the sum by (n - 1)
    D. Computed by summing all the data values and dividing the sum by the number of items

13. The number of children attending a clinic in a given hospital is an example of ________ variable
    A. Discrete
    B. Continuous
    C. Constant
    D. Qualitative

14. The cumulative frequency curve is also called
    A. Ogive
    B. Frequency Curve
    C. Histogram
    D. Frequency Polygon

15. A frequency polygon is constructed by plotting the frequency of the class interval and the
    A. The upper limit of the class
    B. The lower limit of the class
    C. Mid value of the class
    D. Any values of the class

16. Events having an equal chance of occurrence are called
    A. Independent Events
    B. Mutually Exclusive Events
    C. Exhaustive Events
    D. Equally Likely Events

17. The listed observation; 11, 91, 88, 97, 92, 100 suggests that the distribution is:
    A. Positively skewed
    B. Negatively skewed
    C. Has zero skewness
    D. Left skewed

18. Chi-square test is used to test;
    A. Population mean
    B. Population median
    C. Association between variables
    D. None of the above

19. Pulse rate or blood pressure of patients are known as
    A. Nominal data
    B. Discrete data
    C. Continuous data
    D. Random variable

20. A sample of 5 body weights (in Kgs) is as follows: 116, 168, 124, 132, 110. The sample median is:
    A. 124
    B. 116
    C. 132
    D. 130

SECTION B: **[20 MARKS]**

1. Explain the following concepts as used in biostatistics [3 marks]

   [3 marks]

   i. Variable
   ii. Sample
   iii. Inferential statistics

2. Explain three (3) factors to consider when determining the sources of statistical data [3 marks]

3. Discuss the meaning of the following results derived from data analysis to establish the relationship between the amount of kilocalories consumed and the weight gain among pregnant mothers.
   a) $r = 0.72$; p value=0.026 [3 marks]
   b) $r^2 = 0.59$ [2 marks]

4. The population mean for hb levels is 13.5 g/dl. An experiment was conducted for 9 subjects and the results are as shown below

   Mean = 12.2 g/dl
   Standard deviation = 0.06

   Determine if there is a significant difference between the population means and the experimental mean at a 95% confidence level [4 marks]

5. Explain five (5) methods of data collection that can be used to collect health data
[5 marks]

SECTION C: [30 MARKS]

1. The age of people that attended a healh education seminar was recorded as follows
34,58,25,59,37,67,49,42,36,71,39,53,46,59,62,21,68,74,45,42,64,20,35,65,36,63,58,
29,43,58,42,64,20
   i. Using 6 classes draw a frequency distribution table [4 marks]
   ii. Calculate the mean [4 marks]
   iii. Calculate the quartile deviation [8 marks]

2. Two different methods were used to determine the amount of random blood sugar levels among some adults. The results are as shown;

Method 1	Method 2
Mean =7.2	Mean =3.1
SD =0.24	SD=0.26
n =7	n =5

Determine whether the results obtained from the two methods were significantly different at a 95% confidence level. [8 marks]

3. In a survey, parents indicated their hospital preference for their children. Sixty six (66) preferred hospital A, 40 hospital B and 61 hospital C. Test if there is any significant difference in the preference of these hospitals at a 95% confidence level.
[8 marks]

Table 1

t Distribution: Critical Values of *t*

Degrees of freedom		Significance level					
	Two-tailed test:	10%	5%	2%	1%	0.2%	0.1%
	One-tailed test:	5%	2.5%	1%	0.5%	0.1%	0.05%
1		6.314	12.706	31.821	63.657	318.309	636.619
2		2.920	4.303	6.965	9.925	22.327	31.599
3		2.353	3.182	4.541	5.841	10.215	12.924
4		2.132	2.776	3.747	4.604	7.173	8.610
5		2.015	2.571	3.365	4.032	5.893	6.869
6		1.943	2.447	3.143	3.707	5.208	5.959
7		1.894	2.365	2.998	3.499	4.785	5.408
8		1.860	2.306	2.896	3.355	4.501	5.041
9		1.833	2.262	2.821	3.250	4.297	4.781
10		1.812	2.228	2.764	3.169	4.144	4.587
11		1.796	2.201	2.718	3.106	4.025	4.437
12		1.782	2.179	2.681	3.055	3.930	4.318
13		1.771	2.160	2.650	3.012	3.852	4.221
14		1.761	2.145	2.624	2.977	3.787	4.140
15		1.753	2.131	2.602	2.947	3.733	4.073
16		1.746	2.120	2.583	2.921	3.686	4.015
17		1.740	2.110	2.567	2.898	3.646	3.965
18		1.734	2.101	2.552	2.878	3.610	3.922
19		1.729	2.093	2.539	2.861	3.579	3.883
20		1.725	2.086	2.528	2.845	3.552	3.850
21		1.721	2.080	2.518	2.831	3.527	3.819
22		1.717	2.074	2.508	2.819	3.505	3.792
23		1.714	2.069	2.500	2.807	3.485	3.768
24		1.711	2.064	2.492	2.797	3.467	3.745
25		1.708	2.060	2.485	2.787	3.450	3.725
26		1.706	2.056	2.479	2.779	3.435	3.707
27		1.703	2.052	2.473	2.771	3.421	3.690
28		1.701	2.048	2.467	2.763	3.408	3.674
29		1.699	2.045	2.462	2.756	3.396	3.659
30		1.697	2.042	2.457	2.750	3.385	3.646
32		1.694	2.037	2.449	2.738	3.365	3.622
34		1.691	2.032	2.441	2.728	3.348	3.601
36		1.688	2.028	2.434	2.719	3.333	3.582
38		1.686	2.024	2.429	2.712	3.319	3.566
40		1.684	2.021	2.423	2.704	3.307	3.551
42		1.682	2.018	2.418	2.698	3.296	3.538
44		1.680	2.015	2.414	2.692	3.286	3.526
46		1.679	2.013	2.410	2.687	3.277	3.515
48		1.677	2.011	2.407	2.682	3.269	3.505
50		1.676	2.009	2.403	2.678	3.261	3.496
60		1.671	2.000	2.390	2.660	3.232	3.460
70		1.667	1.994	2.381	2.648	3.211	3.435
80		1.664	1.990	2.374	2.639	3.195	3.416
90		1.662	1.987	2.368	2.632	3.183	3.402
100		1.660	1.984	2.364	2.626	3.174	3.390

Table 2

F Distribution: Critical Values of *F* (5% significance level)

ν_2 \ ν_1	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**14**	**16**	**18**	**20**
1	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54	241.88	243.91	245.36	246.46	247.32	248.01
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.42	19.43	19.44	19.45
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.71	8.69	8.67	8.66
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.87	5.84	5.82	5.80
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.64	4.60	4.58	4.56
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.96	3.92	3.90	3.87
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.53	3.49	3.47	3.44
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.24	3.20	3.17	3.15
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.03	2.99	2.96	2.94
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.86	2.83	2.80	2.77
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.74	2.70	2.67	2.65
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.64	2.60	2.57	2.54
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.55	2.51	2.48	2.46
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.48	2.44	2.41	2.39
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.42	2.38	2.35	2.33
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.37	2.33	2.30	2.28
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.33	2.29	2.26	2.23
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.29	2.25	2.22	2.19
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.26	2.21	2.18	2.16
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.22	2.18	2.15	2.12
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.25	2.20	2.16	2.12	2.10
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.23	2.17	2.13	2.10	2.07
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.20	2.15	2.11	2.08	2.05
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.18	2.13	2.09	2.05	2.03
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.16	2.11	2.07	2.04	2.01
26	4.22	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.15	2.09	2.05	2.02	1.99
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25	2.20	2.13	2.08	2.04	2.00	1.97
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.12	2.06	2.02	1.99	1.96
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22	2.18	2.10	2.05	2.01	1.97	1.94
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.09	2.04	1.99	1.96	1.93
35	4.12	3.27	2.87	2.64	2.49	2.37	2.29	2.22	2.16	2.11	2.04	1.99	1.94	1.91	1.88
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.00	1.95	1.90	1.87	1.84
50	4.03	3.18	2.79	2.56	2.40	2.29	2.20	2.13	2.07	2.03	1.95	1.89	1.85	1.81	1.78
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.92	1.86	1.82	1.78	1.75
70	3.98	3.13	2.74	2.50	2.35	2.23	2.14	2.07	2.02	1.97	1.89	1.84	1.79	1.75	1.72
80	3.96	3.11	2.72	2.49	2.33	2.21	2.13	2.06	2.00	1.95	1.88	1.82	1.77	1.73	1.70
90	3.95	3.10	2.71	2.47	2.32	2.20	2.11	2.04	1.99	1.94	1.86	1.80	1.76	1.72	1.69
100	3.94	3.09	2.70	2.46	2.31	2.19	2.10	2.03	1.97	1.93	1.85	1.79	1.75	1.71	1.68

TABLE 3

χ^2 (Chi-Squared) Distribution: Critical Values of χ^2

Degrees of freedom	*Significance level* 5%	1%	0.1%
1	3.841	6.635	10.828
2	5.991	9.210	13.816
3	7.815	11.345	16.266
4	9.488	13.277	18.467
5	11.070	15.086	20.515
6	12.592	16.812	22.458
7	14.067	18.475	24.322
8	15.507	20.090	26.124
9	16.919	21.666	27.877
10	18.307	23.209	29.588

Critical Values for the ***Q***-Test of a Single Outlier (Q_{10})					
α⇒ / ***n***⇓	0.1	0.05	0.04	0.02	0.01
3	0.941	0.970	0.976	0.988	0.994
4	0.765	0.829	0.846	0.889	0.926
5	0.642	0.710	0.729	0.780	0.821
6	0.560	0.625	0.644	0.698	0.740
7	0.507	0.568	0.586	0.637	0.680
8	0.468	0.526	0.543	0.590	0.634
9	0.437	0.493	0.510	0.555	0.598
10	0.412	0.466	0.483	0.527	0.568