CHUKA UNIVERSITY

UNIVERSITY EXAMINATIONS

RESIT/SPECIAL EXAMINATION

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

NURU 272/NURS 393: BIOSTATISTICS

STREAMS: B.SC (NURSING) **TIME: 2 HOURS**

DAY/DATE: THURSDAY 04/11/2021 **8.30 A.M. – 10.30 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
- You are required to **show all** your workings
- Write your answers legibly and **use your time wisely**

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

1. The branch of biostatistics that deals with testing of hypothesis, making predictions using data is called as
   A. Descriptive biostatistics
   B. Inferential biostatistics
   C. Both A and B
   D. Comparative biostatistics
2. Chi-square test X^2
   A. Measures the degree of deviation of the experimental result from the expected result
   B. To test the population variance and sample variance
   C. To test the closeness of observed and expected frequency
   D. All of the above
3. Standard deviation is the square of:
   A. Variance
   B. Mode
   C. Regression

D. Standard error

4. The listed observation; 10, 4, 16, 5, 18, 12, 96 suggests that the distribution is:
   A. Positively skewed
   B. Negatively skewed
   C. Has zero skewness
   D. Left skewed
5. The specific statistical methods that can be used to summarize or to describe a collection of data is called:
   A. Descriptive statistics
   B. Inferential statistics
   C. Analytical statistics
   D. Conclusive statistics
6. For a sample to be truly representative of the population, it must truly be?
   A. Fixed
   B. Random
   C. Specific
   D. Casual
7. The stages of a malignant disease (cancer) is recorded using the symbols 0, I, II, III, IV. We say that the scale used is:
   A. Alphanumeric
   B. Numerical
   C. Ordinal
   D. Nominal
8. 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
9. The branch of biostatistics that deals with methods of collection, organization and presentation of data is termed?
   A. Inferential statistics
   B. Descriptive biostatistics
   C. Both A and B
   D. Comparative Biostatistics
10. Independent events are those which:
   A) Cover the entire sample space
   B) Can never occur together
   C) Do not influence the probability of one another
   D) Always occur together
11. Outliers can produce problematic in statistics since they can skew the results. Rank the following measures in order or "most affected by outliers" to "least affected by outliers".
   A) Mean, median, range
   B) Median, mean, range
   C) Range, median, mean
   D) Range, mean, median
12. The mode of a frequency distribution can be determined graphically by:
   A. Histogram
   B. Frequency curve

C. Frequency polygon
D. Ogive A

13. A list of 5 patients pulse rates is: 68, 78, 90, 74, 98. What is the median of the pulse rate among the patients?
    A. 74
    B. 68
    C. 78
    D. 90
14. Which of the following describe the middle part of a group of numbers?
    A. Measures of central tendency
    B. Measures of variation
    C. Measures of association
    D. Measures of skewness
15. If the mean is greater than the mode, the distribution will be?
    A. Positively skewed
    B. Negatively skewed
    C. Symmetrical
    D. None of these
16. A varaiable which has some chance or probability of its occurrence is known as;
    A. Simple variable
    B. Random variable
    C. Qualitative variable
    D. Quantitatve variable
17. A correlation coefficient is a number between;
    A. +1 and +2
    B. 0 and +1
    C. -1 and 0
    D. -1 and +1
18. The birth weights in a hospital are to be presented in a graph. This is best done by a:
    A. Bar diagram.
    B. Pie chart.
    C. Histogram
    D. Pictogram
19. Which of the following is a measure of spread in a given data set?
    A. Mean
    B. Mode
    C. Median
    D. Range
20. The hb levels of patients in a given hospital is?
    A. Qualitative variables
    B. Discrete variables
    C. Absolute variable
    D. Continuous variables

SECTION B: [20 MARKS]

1. Distinguish between the following terms as used in biostatistics.
   a. Statistics and Biostatistics [2 marks]
   b. Variable and Attribute [2 marks]
   c. t-test and Chi-square [2 marks]

2. The average age of hypertensive patients in a given County is 52.2. A research was done among 10 hypertensive patients attending a clinic in one of the hospitals in the county. The average age was noted to be 48.4 with a standard deviation of 6.8. Determine if there is a significant difference between the population mean and the research mean at a 95% confidence level. [4 marks]

3. The following are ages of participants who were involved in a clinical trial; 54, 72, 32, 30, 26, 21, 65, 44, 26, 63, 43, 25, 59, 18, 58, 21, 75, 37, 64, 34, 42, 62,45, 58, 74, 59, 25, 61, 38, 49, 22, 59, 73, 36 . Constuct a frequency distribution table using 7 clasess and identify the modal class.
   [6 marks]

4. The following are the ages of 10 patients attending a given hospital; 24, 58, 30, 19, 28, 76, 44, 36. Determine if the largest value is an outliers at a 99% confidence level. [4 marks]

SECTION C: [30 MARKS]

1. Discuss with relevant examples, four (4) levels of measurements as used in statistics. [12 marks]

2. Two different methods were used to determine the body mass index of male adults. The results are as shown below

Method 1	=22.4	Method 2	=20.8
SD	=0.56	SD	=0.68
n	=8	n	=9

   Determine if there is a significant difference between the two means at a 95% confidence level. [8 marks]

3. A research was undertaken to determine whether occupation was independent of a given disease. The result are as shown below;

	Disease	
Occupation	**Present (Yes)**	**Absent (No)**

Occupation A	60	20
Occupation B	45	35
Occupation C	25	40

Determine whether the disease is independent of occupation. [10 marks]

TABLE 1

t* Distribution: Critical Values of *t

		Significance level					
Degrees of freedom	*Two-tailed test*: *One-tailed test*:	10% 5%	5% 2.5%	2% 1%	1% 0.5%	0.2% 0.1%	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					

v_1 / v_2	**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

TABLE 2

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

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

	Significance level		
Degrees of freedom	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

Table 4

Critical Values for the Q-Test of a Single Outlier (Q_{10})					
α⇒	0.1	0.05	0.04	0.02	0.01
n⇓					
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