



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)
MAIN CAMPUS
SCHOOL OF NURSING MIDWIFERY AND PARAMEDICAL SCIENCES
UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR
FOR THE DEGREE OF BACHELOR NURSING/MIDWIFERY**

COURSE CODE: NCN 227/ NMM 227

COURSE TITLE MEDICAL BIOSTATISTICS: INFERENCE STATISTICS

DATE: 14/4/2023 TIME 8.00-11.00 A.M

INSTRUCTIONS TO CANDIDATES

- I. WRITE YOUR UNIVERSITY REGISTRATION NUMBER ON EVERY PAGE.**
- II. DO NOT WRITE YOUR NAME ON ANY PAGE YOU USE.**
- III. THIS PAPER HAS 20 MCQS; 5 SHORT ANSWER QUESTIONS AND 2 LONG ANSWER QUESTIONS**
- IV. ANSWER ALL THE QUESTIONS.**
- V. READ CAREFULLY THE ADDITIONAL INSTRUCTIONS PRECEDING EACH SECTION.**

TIME: 3 Hours

SECTION A: MCQS-40 MARKS

1. Consider the sampling distribution of a sample statistic. If the sample size is increased, which of the following will happen?

- A. The bias of the statistic will decrease.
- B. The variability of the statistic will decrease.
- C. The variability of the statistic will increase.
- D. The sampling distribution will have a less normal shape.

2. Kenya has 47 counties which includes Mombasa, Kwale, Lamu and Kilifi. Some people who live in the four counties feel especially strongly that Coastal are should be independent of the rest of Kenya. A survey is to be taken about attitudes towards independence of Coastal the sampling distribution of the sample mean height based on samples of size 10. Which of the methods below would produce a histogram of this sampling distribution? The survey will cover all of Kenya.

What would be the best way to take the survey?

- A. Set up a website where people can post their opinions
- B. Use Table of Random Numbers
- C. A cluster sampling
- D. A simple random sample

3. Which of the descriptions below best describes simple random sampling?

- A. Each individual has equal chance to be included in the sample.
- B. A newspaper contains an advertisement for people's opinions on a certain issue. The sample consists of those people who reply to the advertisement.
- C. Subgroups of the population (such as marginalized and non-marginalized) are guaranteed to be properly represented in the sample.
- D. Each individual has the same chance to be in the sample, independently of other individuals.

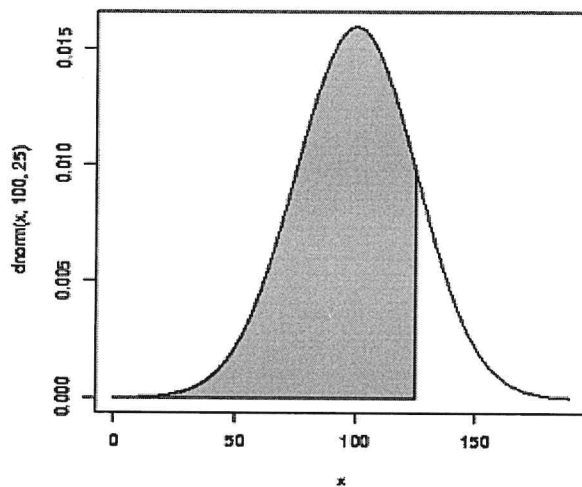
4. What is the relationship between sample size and the standard error of the mean? (*Hint*: The law of large numbers applies here: the larger the sample is, the better it will reflect that particular population.

- A. The standard error decreases as the sample size decreases.
- B. The standard error is unaffected by the sample size.
- C. The standard error increases as the sample size increases.
- D. The standard error decreases as the sample size increases

5. Below is the normal distribution curve with mean $\mu = 100$ and standard deviation $\sigma = 25$

What proportion of the curve is the unshaded area?

- A. less than 125
- B. greater than 0.90
- C. greater than 0.50
- D. less than 0.50



6. If, after performing a Student test for comparison of means, the p value = 0.0256, then:

- A. We reject H_0 and accept H_1
 - B. We fail to reject H_0
 - C. We reject H_1
 - D. We cannot decide
7. Which of the following is true for the coefficient of correlation?
- A. The coefficient of correlation is not dependent on the change of scale
 - B. The coefficient of correlation is not dependent on the change of origin
 - C. The coefficient of correlation is not dependent on both the change of scale and change of origin
 - D. The correlation coefficient is dependent on both scale and origin
8. . What is a Type II error?
- A. investigator rejects a null hypothesis that is actually true in the population
 - B. Accepting the null hypothesis when it should have been rejected.
 - C. Considering the alternate hypothesis as false when it actually it was true.
 - D. When the obtained p-value is higher than 0.05.
9. Which of the following values is used as a summary measure for a population? Such as population standard deviation?
- A Population parameter
 - B Sample parameter
 - C Sample statistic
 - D Variance
10. The Kruskal-Wallis test is the non-parametric alternative to the
- A. One way ANOVA
 - B. Factorial design
 - C. Two way ANOVA
 - D. Confidence interval
11. Which of the following is **NOT** a branch of statistics?

A Descriptive statistics

B Inferential statistics

C Industry statistics

D Both A and B

12. 13. 95% confidence interval refers to:

A. Considering 1 out of 20 chances are taken to be wrong.

B. Considering 1 out of 100 chances are taken as wrong.

C. Considering 95 out of 100 chances are taken as wrong.

D. Considering 5 out of 20 chances are taken as wrong.

13. Which of the following would indicate that a dataset is not bell-shaped?

A. The range is equal to 5 standard deviations.

B. The range is larger than the interquartile range.

C. The mean is much smaller than the median.

D. There are no outliers.

14. Probability values fall on scale between:

A. -1 to +1

B. 0 and 100.

C. 0 to 1

D. 0.05 to 0.01

15. For which of the following sample sizes would the standard error of the distribution of means be the smallest?

A. 1

B. 100

C. 200

D. 42

16. In a random sample of 1000 students, $p^{\wedge} = 0.80$ (or 80%) were in favor of longer hours at the school

library. The standard error of p^{\wedge} (the sample proportion) is

- A. .013
- B. .160
- C. .640
- D. .800

17. The process of using sample data to estimate the values of unknown population parameters is called

- A. Estimate
- B. Interval estimate
- C. Estimator
- D. Estimation

18. The probability associated with confidence interval is called

- A. Confidence coefficient
- B. Degrees of freedom
- C. Confidence limits
- D. Level of confidence

19. What is statistical power in the context of association studies?

- A. The ability of a study to detect a true association between a genetic variant and a disease
- B. The ability of a study to exclude the possibility of a false association between a genetic variant and a disease
- C. The probability of finding a significant association between a genetic variant and a disease by chance alone

D. The probability of detecting a false positive association between a genetic variant and a disease

20. Unlike non parametric tests, parametric test make certain assumptions about

- A. The underlying distributions
- B. The population size
- C. The sample size
- D. T-distribution

SHORT ANSWER QUESTIONS-40 MARKS

1. What is margin of error? (3 Marks)

b). Suppose that the Gallup Organization's latest poll sampled 1,000 people from the United States, and the results show that 520 people (52 percent) think the president is doing a good job, compared to 48 percent who don't think so. Find, at 95% confidence level the ME and give your conclusion (8 Marks)

2. Differentiate between Stratified and cluster sampling methods (4 marks)

3. Outline the steps of developing a polygon (10 Marks)

3. Data set below represents exam scores for 6 second year nursing students:

60, 72, 76, 68, 74, and 58. Calculate the standard deviation (6 Marks)

4. Two students from SONMAPS applied for elective posts to represent the university students for two vacancies for the same post. The probability of student A's selection is $\frac{1}{3}$ and that of B's selection is $\frac{1}{2}$. What is the probability that neither of them will be selected? (5 Marks)

5. Define the following:

i. Central limit theorem states (2 Marks)

ii. Student's t test (2 Marks)

LONG ANSWER QUESTIONS-40 MARKS

1. a) Determine if there exists a linear relationship between Variables X and Y from the data below:

(18 Marks)

i) X (-1, 1, 2, 4, 6, 7)

ii) Y (-1, 2, 3, 3, 5, 8)

b) What is the strength of the relationship? (2 marks)

2. a). A neurologist is testing the effect of a drug on response time by injecting 100 rats with a unit dose of the drug subjecting each to neurological stimulus and recording its response time. The neurologist knows that the mean response time of rats not injected with the drug is 1.2 seconds. The mean of the injected rat's response time is 1.05 seconds with a sample standard deviation of 0.5 seconds. With an aid of a distribution curve, do you think that the drug has an effect on response time? (14 Marks)

b) Define significance test (2 Marks)

c) Differentiate between Type 1 and Type 2 error (4 Marks)

END

STANDARD NORMAL DISTRIBUTION: Table Values Represent AREA to the LEFT of the Z score.

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.9	.00005	.00005	.00004	.00004	.00004	.00004	.00004	.00004	.00003	.00003
-3.8	.00007	.00007	.00007	.00006	.00006	.00006	.00006	.00005	.00005	.00005
-3.7	.00011	.00010	.00010	.00010	.00009	.00009	.00008	.00008	.00008	.00008
-3.6	.00016	.00015	.00015	.00014	.00014	.00013	.00013	.00012	.00012	.00011
-3.5	.00023	.00022	.00022	.00021	.00020	.00019	.00019	.00018	.00017	.00017
-3.4	.00034	.00032	.00031	.00030	.00029	.00028	.00027	.00026	.00025	.00024
-3.3	.00048	.00047	.00045	.00043	.00042	.00040	.00039	.00038	.00036	.00035
-3.2	.00069	.00066	.00064	.00062	.00060	.00058	.00056	.00054	.00052	.00050
-3.1	.00097	.00094	.00090	.00087	.00084	.00082	.00079	.00076	.00074	.00071
-3.0	.00135	.00131	.00126	.00122	.00118	.00114	.00111	.00107	.00104	.00100
-2.9	.00187	.00181	.00175	.00169	.00164	.00159	.00154	.00149	.00144	.00139
-2.8	.00256	.00248	.00240	.00233	.00226	.00219	.00212	.00205	.00199	.00193
-2.7	.00347	.00336	.00326	.00317	.00307	.00298	.00289	.00280	.00272	.00264
-2.6	.00466	.00453	.00440	.00427	.00415	.00402	.00391	.00379	.00368	.00357
-2.5	.00621	.00604	.00587	.00570	.00554	.00539	.00523	.00508	.00494	.00480
-2.4	.00820	.00798	.00776	.00755	.00734	.00714	.00695	.00676	.00657	.00639
-2.3	.01072	.01044	.01017	.00990	.00964	.00939	.00914	.00889	.00866	.00842
-2.2	.01390	.01355	.01321	.01287	.01255	.01222	.01191	.01160	.01130	.01101
-2.1	.01786	.01743	.01700	.01659	.01618	.01578	.01539	.01500	.01463	.01426
-2.0	.02275	.02222	.02169	.02118	.02068	.02018	.01970	.01923	.01876	.01831
-1.9	.02872	.02807	.02743	.02680	.02619	.02559	.02500	.02442	.02385	.02330
-1.8	.03593	.03515	.03438	.03362	.03288	.03216	.03144	.03074	.03005	.02938
-1.7	.04457	.04363	.04272	.04182	.04093	.04006	.03920	.03836	.03754	.03673
-1.6	.05480	.05370	.05262	.05155	.05050	.04947	.04846	.04746	.04648	.04551
-1.5	.06681	.06552	.06426	.06301	.06178	.06057	.05938	.05821	.05705	.05592
-1.4	.08076	.07927	.07780	.07636	.07493	.07353	.07215	.07078	.06944	.06811
-1.3	.09680	.09510	.09342	.09176	.09012	.08851	.08691	.08534	.08379	.08226
-1.2	.11507	.11314	.11123	.10935	.10749	.10565	.10383	.10204	.10027	.09853
-1.1	.13567	.13350	.13136	.12924	.12714	.12507	.12302	.12100	.11900	.11702
-1.0	.15866	.15625	.15386	.15151	.14917	.14686	.14457	.14231	.14007	.13786
-0.9	.18406	.18141	.17879	.17619	.17361	.17106	.16853	.16602	.16354	.16109
-0.8	.21186	.20897	.20611	.20327	.20045	.19766	.19489	.19215	.18943	.18673
-0.7	.24196	.23885	.23576	.23270	.22965	.22663	.22363	.22065	.21770	.21476
-0.6	.27425	.27093	.26763	.26435	.26109	.25785	.25463	.25143	.24825	.24510
-0.5	.30854	.30503	.30153	.29806	.29460	.29116	.28774	.28434	.28096	.27760
-0.4	.34458	.34090	.33724	.33360	.32997	.32636	.32276	.31918	.31561	.31207
-0.3	.38209	.37828	.37448	.37070	.36693	.36317	.35942	.35569	.35197	.34827
-0.2	.42074	.41683	.41294	.40905	.40517	.40129	.39743	.39358	.38974	.38591
-0.1	.46017	.45620	.45224	.44828	.44433	.44038	.43644	.43251	.42858	.42465
-0.0	.50000	.49601	.49202	.48803	.48405	.48006	.47608	.47210	.46812	.46414

t Table

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
one-tail	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
1000	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300
Z	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%
	Confidence Level										