



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF COMMERCE, HUMAN SCIENCES AND EDUCATION

DEPARTMENT OF TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING (TVET)

QUALIFICATION : MUST BRIDGING PROGRAMME - TVET AGRICULTURE SPECIALISATION	
QUALIFICATION CODE: 04NBTA	LEVEL: 4
COURSE CODE: FAS411S	COURSE NAME: FUNDAMENTALS OF AGRICULTURAL STATISTICS
SESSION: JULY 2025	PAPER: 2
DURATION: 3 HOURS	MARKS: 100

SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	MS. E MATALI
MODERATOR:	DR. TEOFILUS SHIIMI

INSTRUCTIONS
1. This question paper consists of SECTION A and SECTION B questions 2. For SECTION A write down the letter corresponding to the correct option for each question 3. For SECTION B is essay questions 4. Answer all questions in blue or black ink
ATTACHMENT: Formula sheet, t-table, z-table, chi-square table PERMISSIBLE MATERIALS: 1. Non-Programmable Calculator without the cover

THIS QUESTION PAPER CONSISTS OF 11 PAGES (Including this front page)

SECTION A

QUESTION 1

[10 marks]

Write down the letter corresponding to your choice next to the question number.

1.1. Researchers draw sample because of all the following reasons except

- a) Reduce cost
- b) Can be done in a shorter time frame
- c) Sampling is interesting
- d) Reduction of biases (1)

1.2. A random sample of eight observations from a population containing 58 elements was taken, and the following values were obtained. The sample mean is:

12, 16, 19, 21, 24, 25, 17, 32

- a) 19.25
- b) 3.77
- c) 8
- d) 20.75 (1)

1.3. The narrower the confidence interval,

- a) the more precise it is
- b) the less precise it is
- c) the easier computations
- d) the larger the population (1)

1.4. Which of the following is a property of the median?

- a) Can be distorted by outliers
- b) Cannot be affected by outliers
- c) Third quartile
- d) There may be several medians in the same data set (1)

- 1.5. The following are all examples of qualitative data except:**
- a) Soil type
 - b) Type of season
 - c) Age in years of ten employees
 - d) Crop variety
- (1)
- 1.6. Quantitative variables can be classified as:**
- a) Discrete or continuous
 - b) Nominal or interval
 - c) Normal distribution or nominal
 - d) Ordinal or ratio
- (1)
- 1.7. _____ can be broadly defined as a systematic enquiry into a subject to discover new facts**
- a) Statistics
 - b) Research
 - c) Probability distribution
 - d) Statistical tables
- (1)
- 1.8. The branch of statistics devoted to the summarization and description of data is called:**
- a) Descriptive statistics
 - b) Inferential statistics
 - c) Population statistics
 - d) Sample statistics
- (1)
- 1.9. Variability is a common characteristic in Agriculture. A characteristic that varies from observation to observation in the same group is called.**
- a) Mean
 - b) Median
 - c) Random variable
 - d) Variance
- (1)

1.10. _____ consist of methods for drawing and measuring the reliability of conclusions about population based on information obtained from a sample of the population.

- a) Probability statistics
- b) Descriptive statistics
- c) Inferential statistics
- d) Sample statistics

(1)

SECTION B

QUESTION 2 (TRUE OR FALSE QUESTIONS)

[10 marks]

2.1. Indicate whether each of the following statements is true or false, and provide a justification for your answer.

[10 marks]

2.1.1. In a normal distribution, the mean, median, and mode is always equal.

2.1.2. The null hypothesis states that there is a significant difference between two population parameters.

2.1.3. The coefficient of variation (CV) is calculated as the ratio of the mean to the standard deviation.

2.1.4. The mode is the most frequently occurring value in a dataset.

2.1.5. The mean is always greater than the median in a positively skewed distribution.

2.1.6. The height of a person is an example of a continuous data.

2.1.7. The mean is sensitive to extreme values (outliers).

2.1.8. The values of a chi-square can be zero or positive but never negative.

2.1.9. The t-distribution has a zero mean and a standard deviation of 1.

2.1.10. An event that cannot happen has a probability of -1.

SECTION C

QUESTION 3

[80 marks]

3.1. The table below gives the commuting times (in minutes) from home to work for 30 employees of an Agriculture company. Using the grouped data approximate the sample variance and standard deviation for commuting time for the 30 employees. [8]

18	15	7	24	10
23	28	10	16	12
5	23	24	16	19
26	17	27	17	17
29	18	23	9	26
12	22	14	26	22

3.2. Yogurt is one of the best sources of calcium, providing up to 34% of the DV in one cup. The following table present the distribution of calcium in grams that was measured from 29 small cups of Yogurt. [16]

Protein contents (in grams)	Frequency
0-10	2
10-20	3
20-30	9
30-40	8
40-50	7

3.2.1. Estimate the average calcium for the Yogurt (3)

3.2.2. Estimate the median calcium for the Yogurt (6)

3.2.3. Estimate the mode of calcium for the Yogurt (7)

3.3. Make a Stem-and-Leaf Plot of the following set of data sets: [9]

a) 15, 20, 25, 18, 22, 17, 30, 32, 35, 28 (3)

b) 0.5, 1.2, 1.8, 0.9, 1.1, 0.4, 1.3, 2.0, 2.1 (3)

c) 150, 120, 175, 160, 185, 140, 155, 180, 200 (3)

3.4. Find the Quartile Deviation for the following observations on the number of Mesta plants in 10 equi-sized plots: 13, 9, 16, 4, 8, 19, 7, 23, 21, 12 [10]

3.5. A certain farm owner buys a particular battery for his tractor. He decides to stop buying them if the mean life of these batteries is less than 24 months. A random sample of 9 batteries yielded a mean life of 22 months with a standard deviation of 3 months.

Test whether the farm owner should stop buying these batteries using a 10% level of significance. [15]

3.6. Namib Mills has submitted bids on two separate government contracts A and B. Namib Mills feels that it has 60% chance of winning contract A and 40% chance of winning contract B. Furthermore, it believes that winning contract A is independent of winning contract B. [12]

3.6.1. Draw a tree diagram to represent the above experiment and list the possible outcomes (Hint: Use W to denote Win and F to denote Lose) (4)

3.6.2. Write down the sample space. (2)

3.6.3. What is the probability that Namib Mills will win both contracts? (3)

3.6.4. What is the probability that Namib Mills will win at least 1 of the contracts (3)

3.7. A textile producer has established that the spinning machine stops randomly due to thread breakages at an average rate of 5 stoppages per hour. [10]

3.7.1. What is the probability that in a given hour, 3 stoppages will occur on this spinning machine? (2)

3.7.2. What is the probability that in a given hour, at most 2 stoppages will occur on this spinning machine? (4)

3.7.3. What is the probability that in a given hour, more than 4 stoppages will occur on this spinning machine? (4)

END OF PAPER [100]

FORMULA SHEET

$$M_c = L + \frac{c[0.5n - CF]}{f_{m,c}}$$

$$M_0 = L + \frac{c(f_m - f_{m-1})}{2f_m - f_{m-1} - f_{m+1}}$$

$$\bar{x} = \frac{\sum fx}{n}$$

$$Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$$

$$\bar{x} \pm Z_{\frac{\alpha}{2}} \left(\frac{\sigma}{\sqrt{n}} \right)$$

$$(p_1 - p_2) \pm Z_{\frac{\alpha}{2}} \sqrt{\frac{p_1 q_1}{n_1} + \frac{p_2 q_2}{n_2}}$$

$$t_{stat} = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$$

$$\frac{(n-1)s^2}{\chi^2_{\frac{\alpha}{2}, n-1}} < \sigma^2 < \frac{(n-1)s^2}{\chi^2_{1-\frac{\alpha}{2}, n-1}}$$

$$\chi^2_{stat} = \frac{(n-1)s^2}{\sigma^2}$$

$$\chi^2_{stat} = \sum \frac{(f_o - f_e)^2}{f_e}$$

$$E(X) = \sum x_i p_i$$

$$V(X) = \sum (x_i - \mu)^2 p(x_i)$$

$$P(X = x) = \binom{n}{x} p^x q^{n-x}$$

$$n = \frac{z^2(\sigma^2)}{E^2}$$

$$b = \frac{n \sum xy - \sum x \sum y}{n \sum x^2 - (\sum x)^2}$$

$$a = \bar{y} - b\bar{x}$$

$$\hat{\pi} = \frac{x_1 + x_2}{n_1 + n_2}$$

$$Z_{\alpha} = \frac{(p_1 - p_2) - (\pi_1 - \pi_2)}{\sqrt{\hat{\pi}(1-\hat{\pi}) \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

$$\bar{x} = \frac{\sum x}{n}$$

$$s^2 = \frac{\sum (x_i - \bar{x})^2}{n-1}$$

$$n = \frac{z^2 p(1-p)}{E^2}$$

$$s^2 = \frac{\sum (x_i - \bar{x})^2 f_i}{n-1}$$

$$p \pm z \sqrt{\frac{pq}{n}}$$

$$\bar{x} \pm t_{\frac{\alpha}{2}, n-1} \left(\frac{s}{\sqrt{n}} \right)$$

$$Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$$

$$(\bar{x}_A - \bar{x}_B) \pm t \sqrt{\frac{s_A^2}{n_A} + \frac{s_B^2}{n_B}}$$

$$P(X = k) = \frac{e^{-\theta} \theta^k}{k!}$$

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Z – Table

The table shows cumulative probabilities for the standard normal curve.

Cumulative probabilities for NEGATIVE z-values are shown first. SCROLL DOWN to the 2nd page for POSITIVE z

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

Cumulative probabilities for POSITIVE z-values are shown below.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998

TABLE of CRITICAL VALUES for STUDENT'S t DISTRIBUTIONS

Column headings denote probabilities (α) above tabulated values.

d.f.	0.40	0.25	0.10	0.05	0.04	0.025	0.02	0.01	0.005	0.0025	0.001	0.0005
1	0.325	1.000	3.078	6.314	7.916	12.706	15.894	31.821	63.656	127.321	318.289	636.578
2	0.289	0.816	1.886	2.920	3.320	4.303	4.849	6.965	9.925	14.089	22.328	31.600
3	0.277	0.765	1.638	2.353	2.605	3.182	3.482	4.541	5.841	7.453	10.214	12.924
4	0.271	0.741	1.533	2.132	2.333	2.776	2.999	3.747	4.604	5.598	7.173	8.610
5	0.267	0.727	1.476	2.015	2.191	2.571	2.757	3.365	4.032	4.773	5.894	6.869
6	0.265	0.718	1.440	1.943	2.104	2.447	2.612	3.143	3.707	4.317	5.208	5.959
7	0.263	0.711	1.415	1.895	2.046	2.365	2.517	2.998	3.499	4.029	4.785	5.408
8	0.262	0.706	1.397	1.860	2.004	2.306	2.449	2.896	3.355	3.833	4.501	5.041
9	0.261	0.703	1.383	1.833	1.973	2.262	2.398	2.821	3.250	3.690	4.297	4.781
10	0.260	0.700	1.372	1.812	1.948	2.228	2.359	2.764	3.169	3.581	4.144	4.587
11	0.260	0.697	1.363	1.796	1.928	2.201	2.328	2.718	3.106	3.497	4.025	4.437
12	0.259	0.695	1.356	1.782	1.912	2.179	2.303	2.681	3.055	3.428	3.930	4.318
13	0.259	0.694	1.350	1.771	1.899	2.160	2.282	2.650	3.012	3.372	3.852	4.221
14	0.258	0.692	1.345	1.761	1.887	2.145	2.264	2.624	2.977	3.326	3.787	4.140
15	0.258	0.691	1.341	1.753	1.878	2.131	2.249	2.602	2.947	3.286	3.733	4.073
16	0.258	0.690	1.337	1.746	1.869	2.120	2.235	2.583	2.921	3.252	3.686	4.015
17	0.257	0.689	1.333	1.740	1.862	2.110	2.224	2.567	2.898	3.222	3.646	3.965
18	0.257	0.688	1.330	1.734	1.855	2.101	2.214	2.552	2.878	3.197	3.610	3.922
19	0.257	0.688	1.328	1.729	1.850	2.093	2.205	2.539	2.861	3.174	3.579	3.883
20	0.257	0.687	1.325	1.725	1.844	2.086	2.197	2.528	2.845	3.153	3.552	3.850
21	0.257	0.686	1.323	1.721	1.840	2.080	2.189	2.518	2.831	3.135	3.527	3.819
22	0.256	0.686	1.321	1.717	1.835	2.074	2.183	2.508	2.819	3.119	3.505	3.792
23	0.256	0.685	1.319	1.714	1.832	2.069	2.177	2.500	2.807	3.104	3.485	3.768
24	0.256	0.685	1.318	1.711	1.828	2.064	2.172	2.492	2.797	3.091	3.467	3.745
25	0.256	0.684	1.316	1.708	1.825	2.060	2.167	2.485	2.787	3.078	3.450	3.725
26	0.256	0.684	1.315	1.706	1.822	2.056	2.162	2.479	2.779	3.067	3.435	3.707
27	0.256	0.684	1.314	1.703	1.819	2.052	2.158	2.473	2.771	3.057	3.421	3.689
28	0.256	0.683	1.313	1.701	1.817	2.048	2.154	2.467	2.763	3.047	3.408	3.674
29	0.256	0.683	1.311	1.699	1.814	2.045	2.150	2.462	2.756	3.038	3.396	3.660
30	0.256	0.683	1.310	1.697	1.812	2.042	2.147	2.457	2.750	3.030	3.385	3.646
31	0.256	0.682	1.309	1.696	1.810	2.040	2.144	2.453	2.744	3.022	3.375	3.633
32	0.255	0.682	1.309	1.694	1.808	2.037	2.141	2.449	2.738	3.015	3.365	3.622
33	0.255	0.682	1.308	1.692	1.806	2.035	2.138	2.445	2.733	3.008	3.356	3.611
34	0.255	0.682	1.307	1.691	1.805	2.032	2.136	2.441	2.728	3.002	3.348	3.601
35	0.255	0.682	1.306	1.690	1.803	2.030	2.133	2.438	2.724	2.996	3.340	3.591
36	0.255	0.681	1.306	1.688	1.802	2.028	2.131	2.434	2.719	2.990	3.333	3.582
37	0.255	0.681	1.305	1.687	1.800	2.026	2.129	2.431	2.715	2.985	3.326	3.574
38	0.255	0.681	1.304	1.686	1.799	2.024	2.127	2.429	2.712	2.980	3.319	3.566
39	0.255	0.681	1.304	1.685	1.798	2.023	2.125	2.426	2.708	2.976	3.313	3.558
40	0.255	0.681	1.303	1.684	1.796	2.021	2.123	2.423	2.704	2.971	3.307	3.551
60	0.254	0.679	1.296	1.671	1.781	2.000	2.099	2.390	2.660	2.915	3.232	3.460
80	0.254	0.678	1.292	1.664	1.773	1.990	2.088	2.374	2.639	2.887	3.195	3.416
100	0.254	0.677	1.290	1.660	1.769	1.984	2.081	2.364	2.626	2.871	3.174	3.390
120	0.254	0.677	1.289	1.658	1.766	1.980	2.076	2.358	2.617	2.860	3.160	3.373
140	0.254	0.676	1.288	1.656	1.763	1.977	2.073	2.353	2.611	2.852	3.149	3.361
160	0.254	0.676	1.287	1.654	1.762	1.975	2.071	2.350	2.607	2.847	3.142	3.352
180	0.254	0.676	1.286	1.653	1.761	1.973	2.069	2.347	2.603	2.842	3.136	3.345
200	0.254	0.676	1.286	1.653	1.760	1.972	2.067	2.345	2.601	2.838	3.131	3.340
250	0.254	0.675	1.285	1.651	1.758	1.969	2.065	2.341	2.596	2.832	3.123	3.330
inf	0.253	0.674	1.282	1.645	1.751	1.960	2.054	2.326	2.576	2.807	3.090	3.290