



**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: JUNE 2025	PAPER: 1
DURATION: 3 HOURS	MARKS: 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	MS. E MATALI
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INSTRUCTIONS
<ol style="list-style-type: none">1. This question paper consists of SECTION A and SECTION B questions2. For SECTION A write down the letter corresponding to the correct option for each question3. For SECTION B is essay questions4. 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. **When re-ordering, a farm owner is interested in ordering different animal feed. Looking at the consumption data, which measure of central tendency is useful to him?**
- a) Mean
 - b) Median
 - c) Mode
 - d) All the above
- (1)
- 1.2. **Which of the following is NOT a possible probability?**
- a) 25/100
 - b) 1
 - c) -1
 - d) 0
- (1)
- 1.3. **Mathematical probabilities can have values**
- a) Between -1 and 1 inclusive
 - b) Corresponding to any positive real number
 - c) Between 0 and 1 inclusive
 - d) Quotients of positive whole numbers or zero
- (1)
- 1.4. **An _____ is a process that generate well defined outcomes.**
- a) Simple random sampling
 - b) Experiment
 - c) Joint probability
 - d) Subjective probability
- (1)

- 1.5. Events A and B are said to be mutually exclusive if**
- a) A intersection B is not an empty set
 - b) A union B is empty set
 - c) An intersection B is empty set
 - d) None
- (1)
- 1.6. A pig is chosen at random from a pig house of 16 males and 14 females. What is the probability that the pig chosen is not a male?**
- a) $8/15$
 - b) $7/15$
 - c) 0.35
 - d) 0
- (1)
- 1.7. Which of the following represents the numeric characteristics of the population.**
- a) A statistics
 - b) A parameter
 - c) A variance
 - d) A distribution
- (1)
- 1.8. _____ is the likelihood of an outcome of event**
- a) Sampling
 - b) Experiment
 - c) Cluster sampling
 - d) Probability
- (1)
- 1.9. Fill in the blank to make the following sentence true. "The frequency of a particular outcome is the number of times it occurs within a specific ___ of a population."**
- a) Frequency
 - b) Variance
 - c) Sample
 - d) Distribution
- (1)

1.10. A sample of a population is

- a) An experiment in the population
- b) A subset of the population
- c) A variable in the population
- d) An outcome of the population

(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 The standard deviation measures the central tendency of a dataset.

2.1.2. The probability of an event is always between 0 and 1.

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

2.1.4. A larger sample size reduces the accuracy of an estimate.

2.1.5. The cumulative frequency of the last class in a frequency distribution is equal to the total number of observations.

2.1.6. The range of a data set is calculated by adding the highest and lowest values.

2.1.7. A scatter plot is useful for visualizing the correlation between two quantitative variables.

2.1.8. A small p-value in hypothesis testing suggests that the null hypothesis should be rejected.

2.1.9. A histogram is used to display the relationship between two variables.

2.1.10. The coefficient of variation is expressed as a percentage.

SECTION C

QUESTION 3

[80 marks]

3.1. A fair coin is tossed twice. The outcome of each toss is recorded. [15]

3.1.1. Draw a tree diagram to represent all possible outcomes. (5)

3.1.2. Find the probability of:

a) Getting two heads (2)

b) Getting at least one tail (3)

c) Getting exactly one head (3)

3.2. The following relates to the weights of 36 female students in Namibia University of Science and Technology. The data were recorded to the nearest kilogram. [8]

3.2.1. Using classes 120 to less than 130, 130 to less than 140, and 140 to less than 150..., construct a frequency distribution table for the data. NB your frequency distribution table must include; less than cumulative frequency, percentage frequency and class midpoint.

138	146	168	146	161	164	158	126
173	150	140	138	142	135	173	150
132	147	176	147	144	136	163	135
150	125	148	120	153	149	150	125
152	154	140	145	157	144	165	135

3.3. Over the course of 3 hours 55 batches of harvested crops arrive at a processing facility. The processing facility has been recording the delay in the arrival of each batch, measured in minutes. The number of minutes they were late is shown in the grouped frequency table below. [12]

Minutes late	Frequency
0-10	5
10-20	10
20-30	7
30-40	27
40-50	4
50-60	2

3.3.1. Estimate the mean late arrival time for the batches of crop (4)

3.3.2. Estimate the variance for late arrival time for the batches of crop (4)

3.3.3. Estimate the standard deviation for late arrival time for the batches of crop (4)

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

a) 7, 10, 11, 12, 11, 11, 13, 8, 22, and 23 (3)

b) 1.6, 2.4, 1.8, 2.3, 1.9, 1.6, 2, 4.1, and 4 (3)

c) 121, 90, 97, 96, 110, 118, 128, and 120 (3)

3.5. Suppose that there were 120 students in the classroom and that they could be classified as follows: [14]

3.5.1. Complete the contingency table by calculating the missing values: a, b, c, and d. (4)

Gender	HAIR COLOUR		Total
	Brown	Not Brown	
Male	20	a.	60
Female	b.	30	c.
Total	50	d.	120

3.5.2. Find the probability that a randomly selected: (10)

a) $P(A) =$ (2)

b) $P(A \cap B) =$ (2)

c) $P(A \cup B) =$ (2)

d) $P(B \cap C) =$ (2)

e) $P(A^c \cap B) =$ (2)

3.6. A trade union claims that the average hourly rate paid to domestic cleaners throughout the country is only N\$2,85. To test this claim, a survey amongst a sample of 250 domestic farm workers was conducted. The sample mean was found to be N\$3,03. Assume the population standard deviation of hourly rates paid to domestic farm workers is N\$1,00. Test the hypothesis at 5% significance level that the average hourly rate paid to domestic farm workers is indeed N\$2,85. [12]

3.7. An agriculture clothing store analyzed the value of purchases made on credit card by a sample of 25 credit card customers. The sample mean was found to be N\$165,45 with a sample standard deviation of N\$38,60. Construct a 95% CI for the actual mean value of credit card purchases at this store. [10]

END OF PAPER [100]

FORMULA SHEET

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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