



COLLEGE OF AGRICULTURE, FISHERIES & FORESTRY

**DEPARTMENT OF AGRICULTURAL ECONOMICS AND
EXTENSION EDUCATION**

**TRADE DIPLOMA IN AGRICULTURE YR2
TRADE DIPLOMA IN FISHERIES YR2
UNCLASSIFIED PROGRAMME**

**AGS 501: AGRICULTURAL STATISTICS AND
RESEARCH METHODS**

FINAL EXAMINATION – TRIMESTER 1, 2016

*Time Allowed 3 hours plus 10 minutes reading
Total marks: 100*

INSTRUCTIONS

1. This paper consists of **two** parts and **10** pages.
2. In the **Part I**, there are 20 Multiple Choice Questions. **All** are compulsory.
3. In the **Part II**, there are 6 Long Answer Questions. **All** are compulsory.
4. Answer the questions in the answer booklet provided.
5. Make sure to indicate your **identification number** in all pages you use.
6. You can use permitted calculators.
7. Statistical Tables are attached with a list of formulae.
8. This exam is worth 50% of your overall mark.

PART I : MULTIPLE CHOICE (40 MARKS)

This section consists of 20 multiple choice questions worth 2 marks each. Write the letter corresponding to the best answer in the Answer Sheet provided.

1. If you classified a lecturer's performance as "Excellent", "Good", "Satisfactory" and "Poor", this would be an example of which type of variable?
A. Qualitative B. Quantitative C. Discrete D. Continuous
2. Which of the following consists of the collection, organization and presentation of data?
A. Inductive Reasoning
B. Descriptive Statistics
C. Inferential Statistics
D. Inductive Statistics
3. The 'number of times per week a student misses lecture in AGS 501' is an example of which type of **variable**?
A. discrete B. continuous C. qualitative D. nominal
4. The advantage of stem and leaf plots over grouped frequency distribution is that it
A. is more reliable.
B. can be used when there are lots of data values.
C. is a more systematic way to organize data.
D. can retain the actual data while showing them in graphical form.
5. In a positively skewed or right skewed distribution
A. The mode is less than the median and the median is less than the mean.
B. The mean is less than the median and the median is less than mode.
C. The mean, median and the mode are all equal.
D. None of the above.
6. Which of the following is **not** a basic method to obtain samples?
A. Stratified B. cluster C. irregular D. random
7. Twelve AGS 501 students had their test 1 marks randomly selected for class analysis.
10 13 26 35 15 28 15 24 36 40 46 26
The mode is:
A. 15 B. 26 C. 36 D. 15 and 26

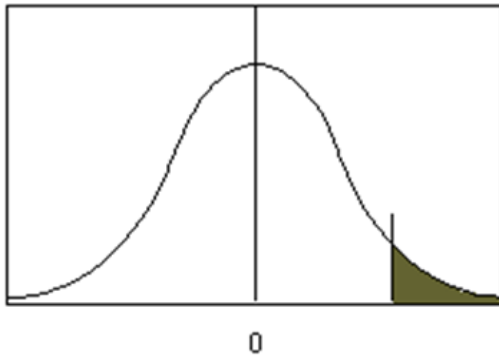
8. Which of the following consists of generalizing from **samples to population** by performing estimations?
- A. Population Parameter
 - B. Sample Statistic
 - C. Descriptive statistics
 - D. Inferential Statistics
9. _____ sampling is used when the population is large and it includes subjects residing over a large geographic area.
- A. Random
 - B. Convenience
 - C. Stratified
 - D. Cluster
10. An Agricultural Statistics tutor at FNU is interested in the mean number of days an AGS 501 student is absent from tutorial classes. The tutor takes her sample by gathering data on 5 randomly selected students from AGS 501 unit. The type of sampling she used is:
- A. Cluster sampling
 - B. Stratified sampling
 - C. Simple Random sampling
 - D. Systematic sampling
11. What are the boundaries of 25 - 26 ounces?
- A. 25.1 – 26.1 ounces
 - B. 25.55 - 26.55 ounces
 - C. 25.5 - 26.5 ounces
 - D. 24.5 – 26.5 ounces
12. If a survey was to be conducted on student borders for Fiji National University. The University has an enrolment of 15,000 students and you want to take a systematic sample of 750 students. What is the value of k ?
- A. 10
 - B. 15
 - C. 20
 - D. 25
13. Which of the following is an appropriate measure of central tendency for nominal data?
- A. Mean
 - B. Median
 - C. Mode
 - D. Midrange.
14. Which of the following is the best measure of central tendency with outliers in the data set?
- A. Mean
 - B. Median
 - C. Mode
 - D. Average
15. Let X be the number of days per week that 30 working mothers in Suva do a 30 minute exercise program.

X	Number of Mothers
0	3
1	2
2	3
3	8
4	1
5	9
6	4

The mean is:

- A. 3 B. 3.5 C. 5 D. 5.5

16. Which type of alternative hypothesis is used in the figure below?

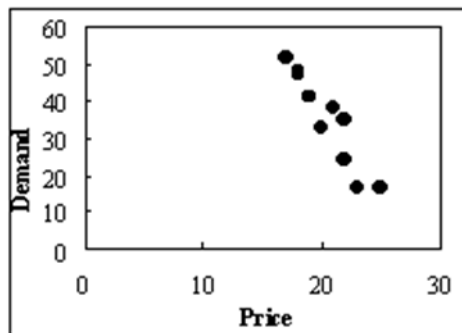


- A. $H_1: \mu = k$ B. $H_1: \mu \neq k$ C. $H_1: \mu > k$ D. $H_1: \mu < k$

17. In regression, the variable being predicted is usually referred to as the

- A. dependent variable B. independent variable
C. coefficient of correlation D. coefficient of determination

18. The following scatter plot indicates



- A. strong positive correlation B. no correlation
C. positive correlation D. negative correlation

19. The coefficient of determination is in the range of

- A. $0 < r^2 < 1$ B. $-1 < r^2 < 1$
C. $0 \leq r^2 \leq 1$ D. $-1 \leq r^2 \leq 1$

20. Determine which of the following statements are false.

- I. Type I error is committed when the null hypothesis is rejected when it is false.
- II. When the value of alpha is increased, the probability of committing a type I error is decreased.
- III. Rejecting the null hypothesis when it is true is called a type I error.

- A. I B. I and II C. III D. II and III

PART II: LONG ANSWER QUESTIONS (60 MARKS)

This section consists of 6 long answer questions worth 10 marks each. Write your answers in the answer booklet provided. Show all necessary working as partial marks will be awarded to partially correct answers.

Question 1

Start on a new page

[5 + 5 = 10 marks]

(A) CAFF dairy farm wants to research on the mean number of cows suffering from tuberculosis. The stockman randomly selects 30 cows to be tested with tuberculin out of 300 cows in the herd.

- (i) What could be the population for this study?
- (ii) What is the sampling method used?
- (iii) What is the sample for this study?
- (iv) What is the statistic for this study?
- (v) What is the parameter for this study?

(B) The following are Assignment marks of 10 students in AGS 501.

45 68 56 90 56 44 68 98 22 33

- (i) Is this a sample or population? Explain your answer.
- (ii) Classify the above data (qualitative/quantitative) and state the level of measurement.
- (iii) Draw a stem leaf plot
- (iv) Find the mean deviation
- (v) Find the range.

Question 2*Start on a new page***[4 + 4 + 2 = 10 marks]**

The amount of protein (in grams) for a variety of fast-food sandwiches is given in table below:

23	30	20	27	44	26	35	20	29	29
25	15	18	27	19	22	12	26	34	15
27	35	26	43	35	14	24	12	23	31
40	35	38	57	22	42	24	21	27	33

- Construct a grouped frequency distribution for the above data using 6 classes.
- Draw a histogram and frequency polygon.
- Draw an Ogive.

Question 3*Start on a new page***[5+1+1+1+2 = 10 marks]**

The table below shows the height of coconut palms growing in Yasana plantations.

Height (metres)	2 - 5	6 - 9	7 - 10	11 - 14	15 - 18
No. of Palms	14	9	7	11	8

- Obtain the class boundaries and class marks of the class intervals.
- What is the upper class limit of the class 11 – 14?
- What is the lower class boundary of the class 6 – 9?
- What is the class mark of the class 7 – 10?
- How many coconut palms are below 10 metres?

Question 4*Start on a new page***[2+2+2+2+2 = 10 marks]**

A survey of all the 30 farmers in a small village was carried out to find the number of tomatoes each has collected in a day. The results are shown in the following table.

Number of tomatoes	1 – 10	11 – 20	21 – 30	31 – 40	41 – 50
Frequency	5	6	4	5	10

- Find the:
- mean
 - median

- iii. mode
- iv. variance
- v. standard deviation

Question 5

Start on a new page

[5+5 = 10 marks]

- (A) The life in months of a variety of plant is known to be approximately normally distributed, with standard deviation 1.25 months. A random sample of 10 such plants has a mean life of 40.5 months. At $\alpha = 0.01$, is there evidence to support the claim that plant life exceeds 40 months?
- (B) The owner of Bula buses claims that his buses take an average of 30 minutes to go from Suva to Nausori. A sample of 30 Bula buses was found to take an average of 31 minutes from Suva to Nausori with a standard deviation of 3 minutes. Is there any significant difference, at 5% level of significance, between what the owner claims and what the sample reveals?

Question 6

Start on a new page

[4+3+3 = 10 marks]

A study was done to compare the length (cm) with the weight (kg) for a variety of fish.

Length(cm), x	54	44	70	61	78	33	48	80	75	52
Weight(kg), y	17	18	20	19	22	14	16	21	23	20

- i. Compute and interpret the value of the correlation coefficient, r .
- ii. Compute and interpret the value of the coefficient of determination, r^2 .
- iii. Find the equation for the regression line and use it to predict the weight of fish if the length is 105cm.

THE END

LIST OF FORMULAE:

1.
$$\text{class width} = \frac{\text{highest} - \text{lowest}}{\text{number of classes}}$$

2.
$$\bar{X} = \frac{\sum f \cdot X_m}{n}$$

3.
$$S^2 = \frac{\sum f(X_m - \bar{X})^2}{n - 1}$$

4.
$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2} \cdot \sqrt{n(\sum y^2) - (\sum y)^2}}$$

5. The regression line equation $y' = a + bx$, where

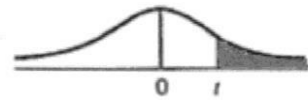
$$a = \frac{(\sum y)(\sum x^2) - (\sum x)(\sum xy)}{n(\sum x^2) - (\sum x)^2}; \quad b = \frac{n(\sum xy) - (\sum x)(\sum y)}{n(\sum x^2) - (\sum x)^2}$$

6.
$$z = \frac{\bar{X} - \mu}{\sigma / \sqrt{n}}; \text{ z-test}$$

7.
$$t = \frac{\bar{X} - \mu}{s / \sqrt{n}}; \text{ t-test}$$

TABLE 1: The t-Distribution Table

The entries in this table give the critical values of t for the specified number of degrees of freedom and areas in the right tail.



df	Area in the Right Tail under the t Distribution Curve					
	.10	.05	.025	.01	.005	.001
1	3.078	6.314	12.706	31.821	63.657	318.309
2	1.886	2.920	4.303	6.965	9.925	22.327
3	1.638	2.353	3.182	4.541	5.841	10.215
4	1.533	2.132	2.776	3.747	4.604	7.173
5	1.476	2.015	2.571	3.365	4.032	5.893
6	1.440	1.943	2.447	3.143	3.707	5.208
7	1.415	1.895	2.365	2.998	3.499	4.785
8	1.397	1.860	2.306	2.896	3.355	4.501
9	1.383	1.833	2.262	2.821	3.250	4.297
10	1.372	1.812	2.228	2.764	3.169	4.144
11	1.363	1.796	2.201	2.718	3.106	4.025
12	1.356	1.782	2.179	2.681	3.055	3.930
13	1.350	1.771	2.160	2.650	3.012	3.852
14	1.345	1.761	2.145	2.624	2.977	3.787
15	1.341	1.753	2.131	2.602	2.947	3.733
16	1.337	1.746	2.120	2.583	2.921	3.686
17	1.333	1.740	2.110	2.567	2.898	3.646
18	1.330	1.734	2.101	2.552	2.878	3.610
19	1.328	1.729	2.093	2.539	2.861	3.579
20	1.325	1.725	2.086	2.528	2.845	3.552
21	1.323	1.721	2.080	2.518	2.831	3.527
22	1.321	1.717	2.074	2.508	2.819	3.505
23	1.319	1.714	2.069	2.500	2.807	3.485
24	1.318	1.711	2.064	2.492	2.797	3.467
25	1.316	1.708	2.060	2.485	2.787	3.450
26	1.315	1.706	2.056	2.479	2.779	3.435
27	1.314	1.703	2.052	2.473	2.771	3.421
28	1.313	1.701	2.048	2.467	2.763	3.408
29	1.311	1.699	2.045	2.462	2.756	3.396
30	1.310	1.697	2.042	2.457	2.750	3.385
31	1.309	1.696	2.040	2.453	2.744	3.375
32	1.309	1.694	2.037	2.449	2.738	3.365
33	1.308	1.692	2.035	2.445	2.733	3.356
34	1.307	1.691	2.032	2.441	2.728	3.348
35	1.306	1.690	2.030	2.438	2.724	3.340

TABLE 2: Areas under Standard Normal Probability Curve (Source: Eton Table)

z																			
	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359	4	8	12	16	20	24	28	32	36
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0754	4	8	12	16	20	24	28	32	36
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141	4	8	12	15	19	22	27	31	35
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517	4	8	11	15	19	22	26	30	34
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879	4	7	11	14	18	22	25	29	32
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224	3	7	10	14	17	21	24	27	31
0.6	.2258	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549	3	6	10	13	16	19	23	26	29
0.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852	3	6	9	12	15	18	21	24	27
0.8	.2881	.2910	.2939	.2967	.2996	.3023	.3051	.3078	.3106	.3133	3	6	8	11	14	17	19	22	25
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389	3	5	8	10	13	15	18	20	23
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621	2	5	7	9	12	14	16	18	21
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830	2	4	6	8	10	12	14	16	19
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015	2	4	5	7	9	11	13	15	16
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177	2	3	5	6	8	10	11	13	14
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319	1	3	4	6	7	8	10	11	13
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441	1	2	4	5	6	7	8	10	11
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545	1	2	3	4	5	6	7	8	9
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633	1	2	3	3	4	5	6	7	8
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706	1	1	2	3	4	4	5	6	6
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767	1	1	2	2	3	4	4	5	5
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817	0	1	1	2	2	3	3	4	4
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857	0	1	1	2	2	2	3	3	4
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890	0	1	1	1	2	2	2	3	3
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916	0	0	1	1	1	2	2	2	2
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936	0	0	1	1	1	1	1	2	2
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952	0	0	0	1	1	1	1	1	1
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964	0	0	0	0	1	1	1	1	1
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974	0	0	0	0	0	1	1	1	1
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981	0	0	0	0	0	0	0	0	1
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986	0	0	0	0	0	0	0	0	1
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990	0	0	0	0	0	0	0	0	0
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993	0	0	0	0	0	0	0	0	0
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995	0	0	0	0	0	0	0	0	0
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997	0	0	0	0	0	0	0	0	0
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998	0	0	0	0	0	0	0	0	0
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	0	0	0	0	0	0	0	0	0
3.6	.4998	.4998	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	0	0	0	0	0	0	0	0	0
3.7	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	0	0	0	0	0	0	0	0	0
3.8	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	0	0	0	0	0	0	0	0	0
3.9	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	0	0	0	0	0	0	0	0	0