



UNIVERSITY OF SWAZILAND

SUPPLEMENTARY EXAMINATION PAPER

PROGRAMME: BSc. in Agricultural & Biosystems Engineering Year III
BSc. in Agricultural Economics and Agribusiness
Management Year III
BSc. in Agricultural Education Year III
BSc. in Agronomy Year III
BSc. in Animal Science Year III
BSc. in Animal Science Dairy Year III
BSc. in Food Science, Nutrition and Technology Year III
BSc. in Consumer sciences Year III
BSc. in Consumer sciences Education Year III
BSc. in Horticulture Year III
BSc. in Textiles Apparel Design and Management Year III

COURSE CODE: AEM 303

TITLE OF PAPER: Applied Agricultural Statistics

TIME ALLOWED: Two (2) Hours

INSTRUCTION: ANSWER ALL QUESTIONS

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THE CHIEF INVIGILATOR**

Question 1.(25 points)

1. The mean live weights of a farmer's steers prior to slaughter was 170 kg in past years. This year his 10 steers were fed on a new diet and obtains the following results.

200	210	220	190	199	240	205	250	240	231
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Use the sample data above with $\alpha = 0.05$ to test the research hypothesis that the mean weight for the steers on the new diet is different from 170.

Key points to be considered.

- a) State the hypotheses. (5 points)
- b) Find the critical value? (5 points)
- c) Calculate the test value? (10 points)
- d) Make decision. (2 points)
- e) Interpret your result. (3 points)

Question 2.(25 points)

2.1 Define factorial experiments and explain the advantage and disadvantages of these experiments? (10 points)

2.2 Explain the layout of Latin square design and the advantage and disadvantages? (10 Points)

2.3 Complete the following ANOVA table for LCD in which each treatment appeared once in each block. (5 points)

Source of variation	df	SS	MS	F
Treatments	_____	12	_____	_____
row	4	_____	6	_____
Column	_____	28	_____	_____
Errors	_____	_____	0.1	_____

Question 3 (25 points)

A research was conducted in a varieties on paddy to test the yielding ability of five varieties (A,B,C,D and E), using a Latin square design. The net plot size was 10 x 5 square metres The results are given below.

D 20	A 24	E 26	B 37	C 42	TOTAL
E 20	B 38	A 24	C 39	D 33	
C 30	E 30	B 38.1	D 40	A 24	
A 30	C 30	D 40	E 28	B 45	
B 44.3	D 30	C 40	A 30	E 25	
TOTAL					

Use $\alpha = 0.05$ and answer the following questions?

- 3.1 Compute the correction factor (CF) (5 points)

- 3. 2.Compute the treatment (or group) sum of squares. (5 points)

- 3.3. Compute the error sum of square. (5 points)

- 3. 4.Construct the corresponding ANOVA table and interpret the result. (10 points)

Question 4 (25 points)

The data came from a study of ice cream consumption that spanned the spring and summer of three years. The ice cream consumption is in pints per capita per week, and temperature is in Fahrenheit.

Consumption(y)	0.2	0.31	0.38	0.4	0.5	0.6	0.2	0.5	0.6
Temp(x)	32	47	55	64	66	63	30	60	68

To Test the significance of the correlation coefficient between consumption(y) and Temperature (x) Use $\alpha = 0.05$

- a. Compute the value of the linear correlation coefficient between consumption and temperature . **(4 points)**
- b. State the hypotheses **(3 points)**
- c. Find the critical value. **(2 points)**
- d. Compute the test value. **(4 points)**
- e.. Summarize the result and find the regression line if r is significant? **(4 points)**
- f. What percentage of variation in price can be explained by the linear relationship between temperature and consumption. **(4 points)**
- g. What is the best predicated consumption amount if temperature is 44? **(4 points)**

END OF PAPER

APPENDIX F Distribution of *t*

df	Level of significance for one-tailed test					
	.10	.05	.025	.01	.005	.0005
	Level of significance for two-tailed test					
	.20	.10	.05	.02	.01	.001
1	3.078	6.314	12.706	31.821	63.657	636.619
2	1.886	2.920	4.303	6.965	9.925	31.598
3	1.638	2.353	3.182	4.541	5.841	12.941
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.859
6	1.440	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.405
8	1.397	1.860	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.681	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850
21	1.323	1.721	2.080	2.518	2.831	3.819
22	1.321	1.717	2.074	2.508	2.819	3.792
23	1.319	1.714	2.069	2.500	2.807	3.767
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.690
28	1.313	1.701	2.048	2.467	2.763	3.674
29	1.311	1.699	2.045	2.462	2.756	3.659
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.291

Abridged from R. A. Fisher and F. Yates, *Statistical Tables for Biological, Agricultural and Medical Research*, 6th ed. (London: Longman, 1974), tab. III. Used by permission of the authors and Longman Group Ltd.

Chi-square Distribution Table

d.f.	.995	.99	.975	.95	.9	.1	.05	.025	.01
1	0.00	0.00	0.00	0.00	0.02	2.71	3.84	5.02	6.63
2	0.01	0.02	0.05	0.10	0.21	4.61	5.99	7.38	9.21
3	0.07	0.11	0.22	0.35	0.58	6.25	7.81	9.35	11.34
4	0.21	0.30	0.48	0.71	1.06	7.78	9.49	11.14	13.28
5	0.41	0.55	0.83	1.15	1.61	9.24	11.07	12.83	15.09
6	0.68	0.87	1.24	1.64	2.20	10.64	12.59	14.45	16.81
7	0.99	1.24	1.69	2.17	2.83	12.02	14.07	16.01	18.48
8	1.34	1.65	2.18	2.73	3.49	13.36	15.51	17.53	20.09
9	1.73	2.09	2.70	3.33	4.17	14.68	16.92	19.02	21.67
10	2.16	2.56	3.25	3.94	4.87	15.99	18.31	20.48	23.21
11	2.60	3.05	3.82	4.57	5.58	17.28	19.68	21.92	24.72
12	3.07	3.57	4.40	5.23	6.30	18.55	21.03	23.34	26.22
13	3.57	4.11	5.01	5.89	7.04	19.81	22.36	24.74	27.69
14	4.07	4.66	5.63	6.57	7.79	21.06	23.68	26.12	29.14
15	4.60	5.23	6.26	7.26	8.55	22.31	25.00	27.49	30.58
16	5.14	5.81	6.91	7.96	9.31	23.54	26.30	28.85	32.00
17	5.70	6.41	7.56	8.67	10.09	24.77	27.59	30.19	33.41
18	6.26	7.01	8.23	9.39	10.86	25.99	28.87	31.53	34.81
19	6.84	7.63	8.91	10.12	11.65	27.20	30.14	32.85	36.19
20	7.43	8.26	9.59	10.85	12.44	28.41	31.41	34.17	37.57
22	8.64	9.54	10.98	12.34	14.04	30.81	33.92	36.78	40.29
24	9.89	10.86	12.40	13.85	15.66	33.20	36.42	39.36	42.98
26	11.16	12.20	13.84	15.38	17.29	35.56	38.89	41.92	45.64
28	12.46	13.56	15.31	16.93	18.94	37.92	41.34	44.46	48.28
30	13.79	14.95	16.79	18.49	20.60	40.26	43.77	46.98	50.89
32	15.13	16.36	18.29	20.07	22.27	42.58	46.19	49.48	53.49
34	16.50	17.79	19.81	21.66	23.95	44.90	48.60	51.97	56.06
38	19.29	20.69	22.88	24.88	27.34	49.51	53.38	56.90	61.16
42	22.14	23.65	26.00	28.14	30.77	54.09	58.12	61.78	66.21
46	25.04	26.66	29.16	31.44	34.22	58.64	62.83	66.62	71.20
50	27.99	29.71	32.36	34.76	37.69	63.17	67.50	71.42	76.15
55	31.73	33.57	36.40	38.96	42.06	68.80	73.31	77.38	82.29
60	35.53	37.48	40.48	43.19	46.46	74.40	79.08	83.30	88.38
65	39.38	41.44	44.60	47.45	50.88	79.97	84.82	89.18	94.42
70	43.28	45.44	48.76	51.74	55.33	85.53	90.53	95.02	100.43
75	47.21	49.48	52.94	56.05	59.79	91.06	96.22	100.84	106.39
80	51.17	53.54	57.15	60.39	64.28	96.58	101.88	106.63	112.33
85	55.17	57.63	61.39	64.75	68.78	102.08	107.52	112.39	118.24
90	59.20	61.75	65.65	69.13	73.29	107.57	113.15	118.14	124.12
95	63.25	65.90	69.92	73.52	77.82	113.04	118.75	123.86	129.97
100	67.33	70.06	74.22	77.93	82.36	118.50	124.34	129.56	135.81