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**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY SCHOOL OF AGRICULTURAL AND FOOD SCIENCES**

**THIRD YEAR FIRST SEMESTER UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR OF SCIENCE IN AGRIBUSINESS MANAGEMENT,**

**2017/2018 ACADEMIC YEAR**

 **REGULAR**

**COURSE CODE: AAE 3311**

**COURSE TITLE: Quantitative Methods in Agricultural Economics 1**

**EXAM VENUE: Lab STREAM: BSc (Agribusiness Management)**

**DATE: December 2017 EXAM SESSION: 2:00 -4:00 p.m.**

**TIME: 2.00 HOURS**

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**Instructions:**

1. **Answer ALL question in Section A (compulsory) and ANY other TWO questions in Section B.**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**
4. **Candidates are advised to carry a calculator for this examination.**

**SECTION A [30 MARKS]**

**Answer ALL questions from this Section.**

1. You are organizing atree planting event for next week and believe attendance will depend on the weather. You consider the following possibilities are appropriate

|  |  |  |
| --- | --- | --- |
| **Weather** | **Probability = f (x)** | **Attendance = X** |
| Terrible weather | 0.2 | 500 |
| Mediocre weather | 0.6 | 1000 |
| Great weather | 0.2 | 2000 |

* 1. Let X denote the attendance. Why is X a random variable?[2 Marks]
	2. What is the expected attendance?[2 Marks]
	3. Suppose that each tree seedling costs $5 and that the total cost of giving the concert is a fixed $2,000. Let Y = profit = total sales revenue – total cost = 5X -2000.What is the expected profit?[2 Marks]
1. State the assumptions of the simple linear regression model. [6 Marks]
2. State the Gauss–Markov Theorem[3 Marks]
3. AMango juice vendor at JOOUST University football games observes that more Mango juicesare sold the warmer the temperature at game time is. Based on 32 home gamescovering five years, the vendor estimates the relationship between Mango juice sales and temperature to be *y = -240 + 8x*, where y = the number of Mango juices she sells and x = temperature in degrees Fahrenheit,
	1. Interpret the estimated slope and intercept. Do the estimates make sense? Why,or why not?[6 Marks]
	2. On a day when the temperature at game time is forecast to be 800F, predict howmany Mango juices the vendor will sell.[3 Marks]
	3. Below what temperature are the predicted sales zero?[3 Marks]
	4. Sketch a graph of the estimated regression line.[3 Marks]

**SECTION B [40 MARKS]**

**Answer any TWO questions from this Section.**

1. Consider the following observations. You are to do all the parts of this question using only a calculator.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| X | 12 | 11 | 10 | 23 | 11 | 14 | 15 |
| Y | 20 | 40 | 50 | 70 | 10 | 40 | 20 |

* 1. What are the sample means of x and y? [2 Marks]
	2. Compute the least squares estimates of the slope and the intercept and state their interpretation. [5 Marks]
	3. Compute the variance of the random error term, σ2. [2 Marks]
	4. Compute the variance and the standard errors of the least square estimates b1 and b2. [4 Marks]
	5. Compute the covariance of the least estimates b1 and b2. [3 Marks]
	6. Explain the central limit theorem. [5 Marks]
1. In an estimated simple regression model, based on 24 observations, the estimatedslope parameter is 0.310 and the estimated standard error is 0.082.
	1. Test the hypothesis that the slope is zero against the alternative that it is not, at the1% level of significance.[3 Marks]
	2. Test the hypothesis that the slope is zero against the alternative that it is positiveat the 1% level of significance.[3 Marks]
	3. Test the hypothesis that the slope is zero against the alternative that it is negativeat the 5% level of significance. Draw a sketch showing the rejection region.

[3 Marks]

* 1. Test the hypothesis that the estimated slope is 0.5, against the alternative that it isnot, at the 5% level of significance.[3 Marks]
	2. Obtain a 99% interval estimate of the slope.[3 Marks]
	3. Describe three ways in which statistical inferences and carried out. [5 Marks]
1. Consider the following estimated regression equation (standard errors in parentheses):

$$\begin{matrix}Y = 5.83 + 0.869X \\se \left(1.23\right)\left(0.117\right)\end{matrix}$$

R2 = 0.756

Rewrite the estimated equation that would result if

* 1. All values of x were divided by 20 before estimation[4 Marks]
	2. All values of y were divided by 50 before estimation. [3 Marks]
	3. All values of y and x were divided by 20 before estimation. [3 Marks]
	4. Supposing that a simple regression has quantities$\sum\_{}^{}(y\_{i}-\overbar{y} )^{2}$= 631.63 and $\sum\_{}^{}\hat{e}\_{i}^{2}=182.85$ find R2.[3 Marks]
	5. Suppose that a simple regression has quantities N = 20, $\sum\_{}^{}y\_{i}^{2}=5930.94, \overbar{y}=160.35,$ and SSR = 666.72, find R2.[3 Marks]
	6. Suppose that a simple regression has quantities R2 = 0.7911, SST = 552.36, and N = 20, find$\hat{δ}^{2}$.[4 Marks]