



Strathmore
UNIVERSITY

STRATHMORE UNIVERSITY BUSINESS SCHOOL

MASTER OF MANAGEMENT IN AGRIBUSINESS

END OF SEMESTER EXAMINATIONS

MMA 8104: QUANTITATIVE ANALYSIS FOR AGRIBUSINESS I

Date: Friday, 8th February 2019

Time: 3 Hours

Instructions

1. This examination consists of **SIX** questions.
2. Answer Question **ONE** and **ANY OTHER FOUR** questions.

Question 1 (Compulsory) (20 Marks)

- a) A farm manager wishes to implement a new system to collect customer payments. To roll out the process, the management has decided to try the new method, stopping the old one. The summary statistics below gives amounts collected by the two methods in thousand Kenya shillings over a period of time.

Descriptive Statistics: Old method A, New method B

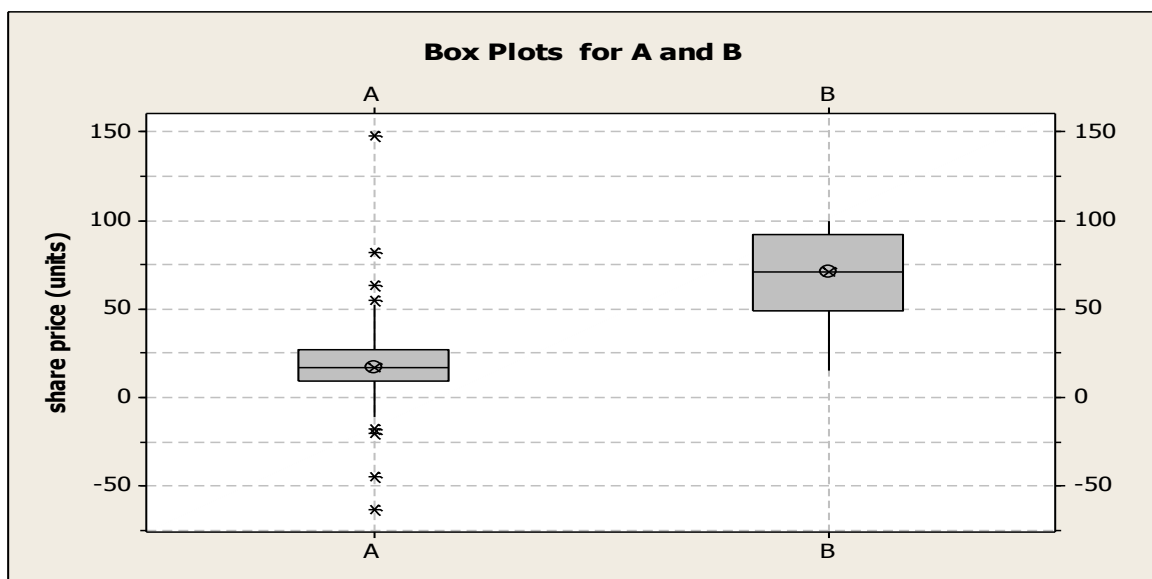
Variable	Total							
	Count	Mean	SE Mean	StDev	Min	Q1	Q3	Max
New Method	100	52.30	2.92	9.23	41.00	43.50	60.50	68.00
Old Method	170	69.47	2.86	11.78	50.00	59.00	77.00	91.00

- (i) Determine the coefficient of variations for the two methods **(3 Marks)**
- (ii) Comment on the effectiveness of the new method compared to the old method. **(1 Marks)**
- b) The amount of time taken by a cow to finish an amount of fodder is found to be normally distributed with mean $\mu = 130$ seconds and standard deviation $\sigma = 45$ seconds. What is the probability that a randomly selected cow will clear the fodder in less than 100 seconds? **(3 Marks)**
- c) Bidii farm is considering Susan for a key position in farm records keeping and data management. After interviewing Susan and reviewing her credentials, the personnel manager feels there is a 75% chance that she would do well on the job and a 25 percent chance that she would not. According to the experience of other companies, the consulting

firm is reasonably accurate in evaluating data entry clerks, as indicated in the following conditional probability table:

Actual Experience	Managers will do well	Managers will not do well
Manager does well	0.9	0.1
Manager does not do well	0.2	0.8

- (i) If the consulting firm predicts Susan will do well, determine the probability that this will be true **(3 Marks)**
- (ii) If the consulting firm predicts Susan will not do well, determine the probability that this will be true **(3 Marks)**
- d) The following diagram shows box plots for closing share prices for two Tomato processing companies A and B for 168 trading sessions at the Nairobi securities Exchange.



Using information in the diagram:

- (i) Identify outliers share values in company A. **(2 Marks)**
- (ii) Describe the distribution of share prices in each of the two companies **(4 Marks)**
- (iii) Suppose your company wish to invest in the stock market. Which company shares would you recommend for your company? Explain. **(1 Mark)**

Question 2 (10 Marks)

- a) Predicting quit rates in Mechanized farms:

Farm workers often give reasons for quitting their jobs, and such reasons generally fall into one of the two categories:

- (i) worker quits to seek or take a different job, or

- (ii) Worker quits to withdraw from the labor force. Economic theory suggests that wages and quit rates are related. Consider the simple linear regression output of quit rate (quits per 100 employees), Y, on average hourly wage, X in a sample of 15 farms below.

Regression Analysis: Quit Rate versus Average Wage

Predictor	Coef	SE	Coef T	P
Constant	4.8615	0.5201	9.35	0.000
AveWage	-0.34655	0.05866	-5.91	0.000

$$S = 0.486220 \quad R\text{-Sq} = 72.9\% \quad R\text{-Sq}(\text{adj}) = 70.8\%$$

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	8.2507	8.2507	34.90	0.000
Residual Error	13	3.0733	0.2364		
Total	14	11.3240			

Use the information given above to:

- (i) Interpret the coefficients in the regression model **(3 Marks)**
- (ii) Determine the correlation coefficient and compare the results with the interpretation of the R-square **(2 Marks)**
- (iii) Write the null and alternative hypothesis for this problem **(2 Marks)**
- (iv) Do the data present sufficient evidence to conclude that average hourly wage rate contributes useful information for the prediction of quit rates. Explain **(3 Marks)**

Question 3 (10 Marks)

The Cabinet secretary in the Ministry of Agriculture is trying to improve Youth attitudes towards farming. He predicted that he met his goal of improving youth attitudes from 65% to 80%. Youths from four counties were asked if they were satisfied that farming in general is good for self-employment. The results are shown in the following table:

	Turkana	Trans Nzoia	Kisumu	Mombasa
Good Attitude	8	5	38	12
Poor Attitude	1	3	19	7
Total	9	8	57	19

Using the most suitable hypothesis testing methods determine whether the results support or reject the Cabinet Secretary’s prediction.

Question 4 (10 Marks)

- a) Wanjiku has been hired as the new Director in charge of Agribusiness Development in her county. As part of her work, she is supposed to present her survey findings to the Management

Board on wages earned by casual workers. The data collected and descriptive statistics for the weekly wages in hundred Kenya shillings of a sample of 40 workers of selected farms are shown below.

30, 42, 30, 54, 40, 48, 15, 17, 51, 42, 25, 42, 31, 27, 25, 36, 29, 27, 38, 31
 43, 32, 36, 40, 36, 22, 30, 31, 19, 48, 16, 42, 32, 21, 22, 46, 33, 41, 21, 22

Descriptive Statistics:weekly wages(in hundred Kshs)

Variable	Total			Minimum	Q1	Median	Q3
	Count	Mean	StDev				
Weekly wages	40	32.83	10.12	15.00	25.00	31.50	41.75
Variable	Maximum		Kurtosis				
Weekly wages	54.00		-0.77				

Using the information given above:

- (i) Prepare a frequency distribution with 8 equal classes (3 Marks)
- (ii) Prepare a management report on behalf of the Director in charge of Agribusiness Development based on these summaries for presentation to the Management Board. Your report should include comments and observations on the following areas:
 - (i) Shape of the Distribution (3 Marks)
 - (ii) Spread of data (4 Marks)

Question 5 (10 Marks)

A company manufactures and sells x televisions per month. If the cost and revenue equations are :

$$C(x) = 72,000 + 60x$$

$$R(x) = 200x - \frac{x^2}{30}$$

- a) What will the approximate changes in revenue? (5 Marks)
- b) Calculate the profit if the production is increased from 1500 and 1510? (5 Marks)

Question 6 (10 Marks)

a) Milk suppliers contract with Dairy firms to sell milk and milk products. Unfortunately, some fraudsters at the dairy firms change supply records in order to make dishonest profits. Forty percent of the suppliers claim they have been victims of this type of fraud. Suppose a simple random sample of 380 suppliers was taken to learn more about how they are affected by this practice:

- i) Determine the probability that the sample proportion will be between 0.45 and 0.55.

(3 Marks)

- ii) Suppose from the sample drawn 55 % confirmed that they are affected by the fraud. Construct the 95% and 99% confidence interval for the population proportion. (2 Marks)
- iii) Interpret the 95% and 99% constructed in (ii) above. (1 Mark)
- b) Waridi flower farm paid out record year-end bonuses of kshs.125,500 per employee for 2018. Suppose we take a sample of employees at the farm to see whether the mean year-end bonus is different from the reported mean of kshs. 125,500 for the population.
- (i) State the type I and Type II error in this case (1 Mark)
- (ii) A sample of 40 Waridi farm employees showed a sample mean year-end bonus of kshs. 118,000. Assume the population standard deviation of $\sigma = 30,000$, calculate the test statistic and draw your conclusion. (3 Marks)