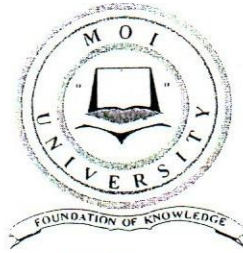


Cohort 4



MUEO

# MOI UNIVERSITY

OFFICE OF THE CHIEF ACADEMIC OFFICER

## UNIVERSITY EXAMINATIONS

### 2009/2010 ACADEMIC YEAR

#### FIRST SEMESTER EXAMINATION

#### FOR

#### MASTER OF BUSINESS

#### ADMINISTRATION

**COURSE CODE:** MBA 860

**COURSE TITLE:** QUANTITATIVE METHODS OF MANAGEMENT

**DATE:** 22<sup>ND</sup> FEBRUARY, 2010 **TIME:** 9.00 A.M. – 12.00 NOON.

---

### INSTRUCTION TO CANDIDATES

- SEE INSIDE.

FIRST SEMESTER EXAMINATIONS FOR THE DEGREE OF  
EXECUTIVE MASTER OF BUSINESS ADMINISTRATION  
MBA 860: QUANTITATIVE METHODS OF  
MANAGEMENT

DATE:

TIME:

**INSTRUCTIONS**

1. Write your index number in the space provided in the answer booklet.
2. Answer Question 1 and three other Questions
3. Show your working as much as possible.

**QUESTION 1 (30 marks)**

- a) A bank had two clerks working on savings accounts. The first clerk handles withdrawals and the second clerk handles deposits.

The service time data was compiled for both withdrawals and deposits and is given below.

Service time per customer in minutes on first clerk:

1.5, 1.0, 2.0, 2.5, 3.5, 4.5, 1.5, 2.5, 3.0, 3.5

Service time per customer in minutes on second clerk:

3.0, 2.5, 4.5, 5.0, 2.5, 3.5, 1.5, 1.0, 2.5, 3.0

Calculate the mean and the standard deviation service time for the first and second clerk. (6 marks)

- b) A sample of 5 voters is randomly selected from the Kenyan population voters register. In this population, it is known that 60% of the voters voted for a party "K"
- i) Find the probability of exactly 3 voters of party "K" in the sample. (3 marks)
  - ii) The number of party "K" voters in this sample of 5 can vary from 0 to 5. Tabulate its probability distribution. (3 marks)
  - iii) Calculate the mean and standard deviation of this distribution. (3 marks)
- c) An auditor claims that 10% of invoices for a company are incorrect. To test this claim, a random sample of 100 invoices is checked and 12 are found to be

incorrect. Test at the 5% level of significance, if the auditors claim is supported by the sample evidence. (3 marks)

d) Find the derivatives of the following functions

i)  $y = 3x^2 + 5(x - 2)^3$  (3 marks)

ii)  $y = 6x^4 + 2(x^2 + 1)^5$  (3 marks)

e) The weekly demand function for a particular product is:

$$q = f(p) = 40,000 + 50p.$$

Where  $q$  is stated in units and  $p$  is stated in K shillings.

i) Determine the total revenue function where the revenue is a function of price "P".

$$R = q(p). \quad (1 \text{ mark})$$

ii) At what point will total revenue be maximized? (2 marks)

iii) Calculate the expected maximum revenue. (1 mark)

f) A businessman has to select two independent investments A and B available to him but lacks the capital to undertake both of them simultaneously. He can choose to take A first and then stop, or if A is successful then take B, or vice versa. The probability of success on A is 0.7, while for B it is 0.4. Both investments require an initial capital outlay of £ 2000 and both return nothing if venture is unsuccessful. Successful completion of A will return £ 3000 (over cost), successful completion of B will return £ 5,000 (over cost). Draw the decision tree and determine the best strategy. (4 marks)



**QUESTION TWO (20 Marks)**

- a) i) Explain the difference between correlation and regression.  
ii) Eight brands of washing powder have been ranked by groups of people in the North Rift (NR) and the South Rift (SR)

BRAND	RANK NR	RANK IN SR
A	1	2
B	4	6
C	8	8
D	3	1
E	6	5
F	2	4
G	5	7
H	7	3

Draw the scatter diagram and find the correlation between the brand ranks in the two regions. (8 marks)

- b) A marriage counseling office consisted of 10 couples and was interested in establishing the correlation between a man's income and a woman's income. The following data was compiled for the 10 couples.  
Income is measured in Thousands of Kenya Shillings.

Couple	Man's Income	Woman's Income
A	20	15
B	30	35
C	30	25
D	20	25
E	20	25
F	30	15
G	40	25
H	30	25
I	40	35
J	40	25

Complete Pearson's correlation coefficient and interpret it. (4 marks)

- c) Different strengths of lager purchased is thought to be associated with gender of the drinker. A brewery has commissioned a survey to explore this view and results survey as shown below:

GENDER	STRENGTH		
	High	Medium	Low
Male	20	50	30
Female	10	55	35

Test the hypothesis at  $\alpha = 5\%$  level to determine if there is any association between the gender of the drinker and the strength of the lager bought. (4 marks)

### QUESTION THREE (20 Marks)

- a) Explain the meaning of the following concepts used in probability theory:
- i) Mutually exclusive event (2 marks)
  - ii) Independent events (2 marks)
  - iii) Conditional probability (2 marks)
  - iv) Exhaustive events (2 marks)
- b) Starting annual salaries for individuals with master's and Bachelor's degrees were collected in two independent random samples. Use the following data to develop a 95% confidence interval estimate of the increase in starting salary that can be expected upon completion of a master's program.

Master's Degree	Bachelor's Degree
$n_1 = 60$	$n_2 = 80$
$x_1 = \text{£ } 35,000$	$x_2 = \text{£ } 30,000$
$s_1 = 2,500$	$s_2 = 2,000$

Develop a point estimate of the difference between the mean annual salaries of the master's and bachelor's degrees holder. Is the increase in starting salary significant?

What assumptions were made to complete the interval estimate? (6 marks)

c) The life times of electric components manufactured by Kaleli Industries Ltd are normally distributed with a mean of 2,500 hours and a standard deviation of 600 hours. If the daily production is 5,000 components how many are expected to have a lifetime of

- i) Less than 2, 600 hours (2 marks)
- ii) Between 2350 hours and 2580 hours (2 marks)
- iii) More than 2380 hours (2 marks)

**QUESTION FOUR (20 Marks)**

a) Briefly explain the following terms as applied in statistical hypothesis testing

- i) Confidence interval
- ii) Type I error
- iii) Type II error
- iv) Level of significance
- v) Power of a test (5 Marks)

b) A production engineer wants to test the assertion that workers using method A will on average complete a job in the same time as they would by using method B. Eight workers are selected at random and each is made to do a given job first in one way and then in the other way. A significance level of  $\alpha = 0.01$  is desired.

The results of the experiment are shown below.

Worker	1	2	3	4	5	6	7	8
Method A	10.0	11.1	9.8	10.0	10.3	10.5	11.3	9.5
Method B	9.8	11.0	8.2	9.5	10.6	10.2	10.6	10.0

Make the test, assuming the underlying population of differences is normally distributed. (8 marks)

c) The demand and supply functions of a three commodity market model are given by:

$$\begin{aligned}
 Q_{d1} &= 200 + 3P_1 + 5P_2 + 3P_3, & Q_{s1} &= 410 + 2P_1 + 3P_2 \\
 Q_{d2} &= 420 + 5P_1 + 7P_2 + 6P_3, & Q_{s2} &= 700 + 3P_1 + 4P_2 + 4P_3 \\
 Q_{d3} &= 8P_1 + 3P_2 + 10P_3, & Q_{s3} &= 350 + 5P_1 + 6P_3
 \end{aligned}$$

Where  $Q_d$  and  $Q_s$  are quantities demanded and supplied and  $P$  is the price. Calculate the equilibrium price and the equilibrium quantity for the market (7 marks)





### QUESTION FIVE (20 Marks)

- a) The probability that a patient recovers from a certain stomach disease is 0.8.  
Suppose 20 people are known to have contracted the disease. ~
- i) What is the probability that exactly 14 survive. (2 marks)
- ii) What is the probability that at least 3 survive (3 marks)
- b) An assembler of electric fans uses motors from 2 sources. Company A supplies 90% of the motors and company B supplies the other 10% of the motors. Suppose it is known that 5% of the motors supplied by company A are defective and 3% of the motors supplied by company B are defective. An assembled fan is found to have a defective motor. What is the probability that this motor was supplied by company B? (5 marks)
- c) Many local newspapers list "stocks of local interest". Suppose that on a certain day, a prospective investor categorized 23 on a certain day, a prospective investor categorized 23 stocks according to whether:
- Their closing on the previous day was less than Ksh. 50 per share (set C).
  - Their price to earnings ratio was less than 20 (set P)
  - Their dividend per share was at least Ksh. 1.50 (set D)

Out of these 23 stocks,

16 were in set P, 3 belonged to both C & D

12 in set C, 10 belonged to both C & P

8 in set D, 7 to belonged to both D & P

2 belonged to all sets.

- i) Construct a Venn diagram showing this information and use it to answer the following:
- ii) How many stock had closing prices of less than Ksh. 50 per share or price to earnings ratios of less than 20?
- iii) How many stocks had none of the characteristics of set C, P or D.
- iv) How many stocks had only dividends per share of at least Ksh. 1.50? (2 marks)

**QUESTION SIX 20 Marks)**

- a) State all the assumption of the classical regression model (6 marks)
- b) In order to estimate this year's inventory (excess inventory) a tyre company sampled 6 dealers and in each case compiled inventory figures for both this year and last year.

X = Inventory last year	Y = Inventory this year
70	60
260	320
150	230
100	120
20	50
60	60

Using this data:

- i) Calculate the least squares line showing how this year's inventory (Y) is related to last year's inventory (X). (4 Marks)
- ii) Construct the 95% confidence interval for  $B_0$  and  $B_1$ . (4 marks)
- iii) Calculate the coefficient of determination  $R^2$  for this data. (6 marks)