THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

A. M. E. C. E. A

P.O. Box 62157
00200 Nairobi - KENYA
Telephone: 891601-6
Fax: 254-20-891084
E-mail:academics@cuea.edu

MAIN EXAMINATION

MAY – AUGUST 2019 TRIMESTER

FACULTY OF COMMERCE

DEPARTMENT OF ACCOUNTING AND FINANCE

EVENING PROGRAMME

CMS 211: INTRODUCTION TO BUSINESS STATISTICS

Date: JULY 2019	Duration: 2 Hours
INSTRUCTIONS: Answer Question ONE and any other TWO Questions	

Q1. a) Two workers on the same job show the following results over a long period of time.

	Worker A	Worker B
Mean time of completing the job (minutes)	30	25
Standard deviation (minutes)	6	4

i) Which worker appears to be more consistent in the time he requires to complete the job? Explain. **(10 MARKS)**

ii) Which worker appears to be faster in completing the job? Explain. **(10 marks)**

b) Suppose the manager of a plant is concerned with the total number of man-hours lost due to accidents for the past 12 months. The company statistician has reported the mean number of man-hours lost per month but did not keep a record of the total sum. Should the manager order the study repeated to obtain the desired information? Explain your answer clearly. **(10 marks)**

Q2. The data below show the earnings per day (in shillings) of 50 casual workers.

236	283	222	249	265
263	221	224	228	217
204	293	259	266	296
283	242	288	238	215

240	283	226	296	245
291	211	219	212	264
207	268	245	263	284
238	274	254	251	237
263	206	248	277	238
264	253	291	281	269

Required:

a) A grouped frequency table starting with class 200 – 209, and using a class width of 10. **(6 marks)**

b) Use the frequency distribution to compute

i) The mean **(5 marks)**

ii) The standard deviation **(5 marks)**

iii) Determine the coefficient of skewness. (use the frequency table). **(4 MARKS)**

(4 marks)

Q3. The frequency distribution below is a summary of gross profits (in £'000) for various companies. The period considered is the first three months of the current financial year.

Profits (£'000)	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No. of companies	6	8	12	18	25	16	8	5	2

The common class width is 10

a) Determine the Arithmetic mean **(5 marks)**

b) Determine the mode **(5 marks)**

c) Determine the median. **(5 marks)**

d) Determine the values of Q_1 and Q_3. **(5 marks)**

Q4.The following data was extracted from a document prepared by company Z.

Salary group Kshs	7500 - 17500	17500 - 27500	27500 - 37500	37500 - 47500	47500 – 57500
No. of employees	40	67	113	25	5

Let $d_i = \frac{x-32,500}{10,000}$

Determine $\bar{d}$ and use it to work out the mean salary of the employees.

CMS 211 INTRODUCTIONS TO BUSINESS STATISTICS FORMULAE

MEASURES OF CENTRAL TENDENCY

1. ARITHMETIC MEAN

   $\ddot{X} = \frac{1}{N}\sum_{i=1}^{n} X_i$

   $\ddot{X} = \frac{1}{N}\sum_{i=1}^{n} x_i f_i$

   $\ddot{X} = h\bar{d} + A$

2. MODE

   $M_O = L_1 + \frac{\Delta 1 C}{\Delta 1 + \Delta 2}$

   $M_O = L_1 + \frac{(fm - f1)C}{(fm - f1) + (fm - f2)}$

3. MEDIAN

   Median = $\frac{n+1}{2}$

   Median = $\frac{1}{2}[\frac{nth}{2}\ item + \frac{n+2th}{2}\ item]$

   $M_D = L_1 + \frac{(\frac{N}{2} - \sum fmd - 1)C}{fmd}$

4. QUARTILES

   $Q_1 = L_{Q1} + \frac{(\frac{N}{4} - \sum fQ - 1)C}{fQ}$

   $Q_3 = L_{Q3} + \frac{(\frac{3N}{4} - \sum fQ - 1)C}{fQ}$

MEASURES OF DISPERSION/VARIABILITY

1. RANGE

   Range = Largest value (L) – Smallest value (S)

   Coefficient of Range = $\frac{L-S}{L+S}$ X 100

2. THE QUARTILE DEVIATION (Q)

   Interquartile range = $Q_3 - Q_1$

Quartile Deviation = $\frac{1}{2}(Q_3 - Q_1)$

Coefficient of Quartile Deviation = $\frac{Q3-Q1}{Q3+Q1}$ X 100

3. THE MEAN DEVIATION (MD)

MD = $\frac{1}{N}\sum|x_i - \ddot{X}|$

MD = $\frac{1}{N}\sum|x_i - \ddot{X}|f_i$

Coefficient of Mean Deviation = $\frac{Mean\ Deviation}{Mean}$ X 100

4. VARIANCE (S^2)

$S^2 = \frac{1}{N}\sum(x_i - \ddot{X})^2$

$S^2 = \frac{1}{N}\sum(x_i - \ddot{X})^2 f_i$

$S^2 = (\frac{1}{N}\sum x_i^2 f_i) - \ddot{X}^2$

$S^2 = (\frac{1}{N}\sum x_i^2) - \ddot{X}^2$

$S_x^2 = h^2 S_d^2$

5. STANDARD DEVIATION (S)

$S = \sqrt{\frac{1}{N}\sum(x_i - \ddot{X})^2}$

$S = \sqrt{\frac{1}{N}\sum(x_i - \ddot{X})^2 f_i}$

$S = \sqrt{(\frac{1}{N}\sum x_i^2 f_i) - \ddot{X}^2}$

$S = \sqrt{(\frac{1}{N}\sum x_i^2) - \ddot{X}^2}$

$S_x = hS_d$

Coefficient of Variability (CV) = $\frac{Standard\ deviation}{Arithmetic\ mean}$ x 100

6. COMBINED MEAN ($\ddot{X}_C$) AND COMBINED STANDARD DEVIATION (S_C)

$\ddot{X}_C = \frac{1}{N}\sum N_i\ddot{X}$

$S_C = \sqrt{\frac{1}{N}\sum N_i(S_i^2 + d_i^2)}$

7. CORRELATION AND REGRESSION

Covariance ($cov_{(xy)}$ or S_{xy}) = $\frac{1}{N}\sum(x_i - \ddot{X})(y_i - \dot{Y})$

$cov_{(xy)}$ or $S_{xy} = (\frac{1}{N}\sum x_i y_i) - \ddot{X}\dot{Y}$

Coefficient of Correlation (r_{xy}) = $\frac{Sxy}{SxSy}$

$$r = \frac{n\sum xy - \left(\sum x\right)\left(\sum y\right)}{\sqrt{n\left(\sum x^2\right) - \left(\sum x\right)^2}\sqrt{n\left(\sum y^2\right) - \left(\sum y\right)^2}}$$

Rank correlation coefficient or spearman's rank correlation coefficient (r_s)

$$\rho = 1 - \frac{6\sum d_i^2}{n(n^2 - 1)}$$

Kendall Rank correlation

$$\tau = \frac{n_c - n_d}{\frac{1}{2}n(n-1)}$$

Pearson r correlation

$$r = \frac{N\sum xy - \sum (x)(y)}{\sqrt{N\sum x^2 - \sum (x^2)][N\sum y^2 - \sum (y^2)]}}$$

Method of least squares

$\sum y = na + b\sum x_i$

$\sum y_i x_i = a\sum x_i + b\sum x_i^2$

$\sum x_i = na + b\sum y_i$

$\sum x_i y_i = a\sum y_i + b\sum y_i^2$

$$b = \frac{n\left(\sum XY\right) - \left(\sum X\right)\left(\sum Y\right)}{n\left(\sum X^2\right) - \left(\sum X\right)^2}$$

$$a = \frac{\left(\sum Y\right) - b\left(\sum X\right)}{n}$$

$$LSMA = a + bX$$

$b = r_{xy} - \frac{Sy}{Sx}$ $\quad\quad$ $a = \dot{Y} - b\ddot{X}$

END