INTERNATIONAL UNIVERSITY OF EAST AFRICA

'Learning to Succeed'

HIGHER EDUCATION CERTIFICATE

END OF SEMESTER EXAMINATIONS - APRIL 2025

PROGRAMME: HEC

YEAR/SEM: YEAR 1/SEMESTER 2

COURSE CODE: FDN 1201

NAME: FONDATION MATHEMATICS TWO

DATE: 2025-04-22

TIME: 2:00-5:00PM

INSTRUCTIONS TO CANDIDATES:

1. Read the instructions very carefully
2. The time allowed for this examination is STRICTLY three hours
3. Read each question carefully before you attempt and allocate your time equally between all the Sections
4. Write clearly and legibly. Illegible handwriting cannot be marked
5. Number the questions you have attempted
6. Use of appropriate workplace examples to illustrate your answers will earn you bonus marks
7. Any examination malpractice detected will lead to automatic disqualification.

DO NOT WRITE ANYTHING ON THE QUESTION PAPER

Section A Attempt ALL Questions (Each question carries 4 marks)

Question 1:

Using the product rule find the derivative of $y = (4x^2 + 2)(3x + 9)$

Question 2:

The following data represent the marks of 20 students.

80	76	90	85	80
70	60	62	70	85
65	60	63	74	75
76	70	70	80	85

Use the marks above to construct a frequency distribution table for the ungrouped data

Question 3:

Mr. Mohammed has a coin that has two side i.e a head(H) and a tail(T). What is the probability of flipping his fair coin twice and get heads?

Question 4:

Find the simple aggregative index number for the year 2000 with 1980 as base year

Commodity	Price in 1980	Price in 2000
A	200	250
B	110	150
C	20	30
D	210	250
E	25	25

Question 5:

A shopper is standing on level ground 800m from the base of a 250 m foot tall department store. The shopper looks up and sees a flag on the store's roof. To the *nearest degree* what is the angle of elevation to the top of the building from the point on the ground where the shopper is standing?

Question 6:

Work out $\int \frac{x^2+8x+15}{x+3} dx$

Question 7:

a) The given data set shows marks of 10 students in a Math test marked out of 20.

15, 14, 14, 15, 15, 14,15, 16, 13, 18

Use the data above to compute the

i) Mean

ii) Median

Question 8:

(Integrate the following

$$\int (10x^8 + 15x^7 + 14x^6 - x^5 - \frac{1}{4}x^4 + 3x^3 + x - 2)dx$$

Question 9:

If $y = x^2$ find $\frac{dy}{dx}$ using the first principal method

Question 10:

Given two independent events A and B. P(A)= Â½ and P(B)=1/4) find P(AUB)

Section B Attempt any three (Each question carries 20 marks)

Question 1:

a) The table below shows the initial salaries in (UGX 000) of employees in a certain company

Annual salary	Number of graduates
1000	3
2000	6
3000	12
4000	9
5000	3
6000	2

Use the table to calculate;

i) mean

ii) median

iii) variance

iv) standard deviation

v) coefficient of variance

Question 2:

a) Determine the following integrals

i) $\int 4\sec^2 x \, dx$

ii) $\int \frac{3x^2-5x}{x} \, dx$ (2 marks)

iii) $\int \frac{4}{3x^2} \, dx$ (2 marks)

b) Evaluate the following definite integrals

i) $\int_1^3 (x^2 - 4x + 3)dx$ (3 marks)

ii) $\int_{-1}^{1} \frac{-3}{4} t^2 dt$ (3 marks)

iii) $\int_0^2 x^2\sqrt{x^3+1} \, dx$ (3 marks)

c) Find the value of a such that $\int_0^a \frac{x^3+x^2+9x+9}{x^2+9} . dx = 4$ (5 marks)

Question 3:

a) During a beauty contest Judges X and Y awarded different points for 8 rounds. Find the correlation between X and Y Using the spearmanâ??s rank correlation coefficient;

X	85	98	105	80	70	90	91	60
Y	130	144	160	125	120	150	152	110

(10 marks)

b) Find the Pearsonian correlation coefficient between sales (in million units) and expenses (in thousand shillings) of the following 10 firms:

Firm	A	B	C	D	E	F	G	H	I
Sales (X)	60	60	65	70	75	75	75	70	70
Expenses(Y)	13	15	16	18	18	17	17	16	15

Question 4:

Required formulas	
Mean for a frequency distribution	$\bar{x} = \frac{\Sigma fx}{\Sigma f}$
Variance	$var(\sigma^2) = \frac{\Sigma fd^2}{\Sigma f}$ where $d = x - \bar{x}$
Standard deviation	$\sigma = \sqrt{var}$
Coefficient of variation	$Cov = \frac{\sigma}{\mu} \times 100$
Mean deviation	$\frac{\Sigma \lvert d \rvert}{n}$
Simple price index	$\boldsymbol{P_{0i} = \frac{p_i}{p_0} \times 100}$
Simple aggregate price index	$\boldsymbol{P_{0i} = \frac{\Sigma p_i}{\Sigma p_0} \times 100}$
Simple average of price relatives	$\boldsymbol{P_{0i} = \frac{\Sigma \frac{p_i}{p_0}}{n} \times 100}$
Peasonian coefficient of correlation	$\boldsymbol{r_{xy} = \frac{\Sigma d_x d_y}{\sqrt{\Sigma d_x^2 \Sigma d_y^2}}}$
	$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[n\Sigma x^2 - (\Sigma x)^2][n\Sigma y^2 - (\Sigma y)^2]}}$
Least squares method	$y = a + bx$ where: $b = \frac{n\Sigma xy - (\Sigma x)(\Sigma y)}{n\Sigma x^2 - (\Sigma x)^2}$ and $a = \bar{y} - b\bar{x}$ ($\bar{y}, \bar{x}$: are the means of y and x, respectively)

Question 5:

a) Given two events A and B are mutually exclusive P(A)=1/3 and P(B)=1/4, Find P(AUB) (4 marks)

b) A black die and white die are thrown at the same time. Display all the possible outcomes . Find the probability of obtaining

i) A total of 5

ii) A total of 11

iii) A total of at least 8

C) A bag contains 6 red balls and 4 green balls. Two balls are selected one at a time without the replacement. Find the probability of selecting at random

I. Both red
II. Both green
III. One green and one red

Question 6:

(a) use the first principle method to derive the following
(i) the product rule formula used in differentiation
(ii) The quotient rule formula used in differentiation

(b) a) Find the integrals of the following

i) $$\int \sqrt{x}\,(5x+9)\,dx$$

ii) $$\int \frac{x^3-3x^2-x+3}{x^2-4x+3}\,dx$$