Answer All Questions

QUESTION ONE:

A- (1) Define the following:

i-   The function

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ii-   Function range

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(2) If $f(x) = x^2 - 3$, $g(x) = 3x + 1$
Find:

i-   (f)(2)

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_____
_____
_____
_____
_____

ii-   g(2)

_____
_____
_____
_____
_____

iii- $\frac{f}{g}$ (2)

_____
_____

_____
_____
_____
_____
iv-   (fog)(2)

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_____
_____
_____
_____
_____

B- Complete:

   i. $\lim\limits_{x\to \cdot} \dfrac{sinx}{x} =$ _____

   ii.   If g(x) = a ,
(Where c is a constant) then;
$\lim\limits_{x\to c} g(x) =$ _____

   iii.   A function of the form:
f(x)=a_nx^n+a_{n-1}x^{n-1}+…+a_1x+a.
is called: _____
of _____ degree, (where n∈ ℝ),

C- Find the following limits:
 (1) $\lim\limits_{x\to 1} \dfrac{x^2-7x+12}{x-3}$

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(2) $\lim\limits_{x\to\infty} \dfrac{2x^5+3x^4+4}{5x^5+2x^3}$

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(3)$\lim\limits_{x\to 2} \dfrac{x^6-64}{x^2-4}$

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(4) $\lim\limits_{x\to\cdot} \dfrac{\sin 3x}{x}$

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QUESTION TWO:

A- (1) the average rate of change of the function y = f(x), when x changes to $x + \Delta x$ is written as:

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(2) Find the first derivative of the function y= f(x) = x^2, from the first principles.

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B- (1) If y = ax^2 , where a is a real number, then $\dfrac{dy}{dx} =$

_____
_____
_____
_____
_____

(2) Find the first derivative of the following functions:

i - $y = \dfrac{3x^2}{x+1}$

_____
_____
_____
_____
_____
_____
_____

ii-   y = sin(2x+3)

_____

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iii- $x^2 + y^2 = 4xy$

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(3) Find the slope of the curve
$y = x^2 - 3x + 1$ at (0, 1)

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C- Evaluate the following integrations.

(1) $\int ax^n . dx$

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(2) $\int (x + 3)(2x - 1) . dx$

_____

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(3) $\int (x^2 - \frac{1}{x^2}) \cdot dx$

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(4) $\int \cos 2x . \cos x . dx$

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(5) $\int \frac{x^2-1}{x-1} . dx$

D- (1) Calculate the distance between two points. A (4, 4), B (8, 2)

(2) The two lines whose slopes are m_1, m_2 said to be parallel if:

(3) Fine the equation of the straight line which is parallel to the line whose gradient is -2 and passes through the original point.

(4) Fine the angle θ between the two straight lines whose gradients are:

$m_1 = -\frac{3}{5}$, $m_2 = \frac{1}{4}$

QUESTION THREE:

A- Define the following:

(1) Statistics:

(2) Mode:

_____
_____

(3) Median:

_____
_____
_____
_____
_____

B- (1) calculate the mode and the median from the following measurements: 3, 7,9,7,8,6,7,9

i- The mode

_____
_____
_____
_____
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_____

ii- the median

_____
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_____
_____
_____
_____

C- (1) Define arithmetic mean

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(2) The mean age of 5 men is 76. If 4 of them are: 72, 76, 75, 81 years old. Find the age of the fifth man.

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C- (1) Define mean deviation

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_____
_____
_____

(2) From the frequency distribution table below:

x	0-	10-	20-	30-	40-	50-
f	5	6	14	7	6	4

Find the following:

i- Class interval:

_____
_____
_____
_____
_____
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ii- Frequency of the fourth class:

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_____

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(iii) Calculate the mean deviation

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QUESTION FOUR:

A- Define the following:

i- Random experiment:

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_____

ii- Sample space:

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_____
_____
_____
_____

iii- Disjoint events

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_____

B-   In an experiment of tossing a coin twice and the scores appeared on the upper face were recorded. Write down:

(i) Sample Space (S)

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(ii) Event that head only appeared on the upper face

_____
_____

_____
_____

(iii) The event that tail appeared on the upper face at most

_____
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_____

C- If A, B are two events in random experiment. Express using set symbols the following:

(i) The event of occurrence of A and not B

_____
_____
_____

(ii) The event of occurrence of A only

_____
_____
_____
_____

(iii) The event of occurrence of both

_____
_____
_____

(iv) The event that neither A nor B occurs

_____
_____
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D- (1) A box contains 4 white balls, 8 red balls, 3 yellow balls. One ball was

drawn at random from the box. What is the probability that the ball drawn is?

(i) White

_____
_____
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_____
_____
_____
_____

(ii) Red

_____
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_____
_____
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(iii) Not yellow

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(iv) White or Red

_____
_____
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(2) If A = {1, 3, 6}, B = {1, 6, 8, 9}, find the following

(i) A' = _____

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_____
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_____
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(ii) B' = _____

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(iii) (A ∩ B) ' = _____

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(iv) A' ∪ B' = _____

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QUESTION FIVE:

A-Define the following:
(1) Zero matrix:

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(2) Square matrix:

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B- From the two matrices:

$$A = \begin{pmatrix} 1 & 2 & 4 \\ 3 & 7 & 8 \\ 11 & 13 & 10 \end{pmatrix}, B = \begin{pmatrix} 5 & 2 & 1 \\ 4 & 7 & 6 \\ 13 & 9 & 12 \end{pmatrix}$$

Find:

(1) The dimension of B

_____
_____
_____
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(2) The elements:

(i) b_{21}: _____

(ii) a_{22}: _____

(3) 2A+B.

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C-(1) Find the transpose for each of the following matrices.

$$A = \begin{pmatrix} 4 & 3 & 2 \\ 1 & -9 & 6 \end{pmatrix}, B = \begin{pmatrix} 5 & 2 \\ 1 & 3 \\ -3 & 1 \end{pmatrix}$$

A =

_____

_____

_____

_____

_____

_____

B =

_____

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_____

(2) From the two matrices above.
Calculate A × B.

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D- (1) Find the values of x, y, and z if:

$$\begin{pmatrix} 2x - 1 & 4 \\ 1 & 3 \\ 7 & 2 \end{pmatrix} = \begin{pmatrix} 3 & 4 \\ y & 3z - 6 \\ 2 & 2 \end{pmatrix}$$

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(2) Find the matrix X which satisfies the following equation:

$$X = \begin{pmatrix} 2 & -1 \\ 4 & 6 \end{pmatrix} + \begin{pmatrix} 3 & 5 \\ 0 & 1 \end{pmatrix}$$

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