

Notations :

- 1.Options shown in green color and with ✓ icon are correct.
- 2.Options shown in red color and with ✗ icon are incorrect.

Change Font Color :	No
Change Background Color :	No
Change Theme :	No
Help Button :	No
Show Reports :	No
Show Progress Bar :	No

Maths1

Section Id :	640653134265
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	14
Number of Questions to be attempted :	14
Section Marks :	50
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653373352
Question Shuffling Allowed :	No

Question Number : 1 Question Id : 6406532034608 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : MATHEMATICS FOR DATA

SCIENCE I (COMPUTER BASED EXAM)"

ARE YOU SURE YOU HAVE TO WRITE EXAM FOR THIS SUBJECT?

CROSS CHECK YOUR HALL TICKET TO CONFIRM THE SUBJECTS TO BE WRITTEN.

(IF IT IS NOT THE CORRECT SUBJECT, PLS CHECK THE SECTION AT THE TOP FOR THE SUBJECTS REGISTERED BY YOU)

Options :

6406536625592. ✓ Yes

6406536625593. ✗ No

Question Number : 2 Question Id : 6406532034609 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

Instructions:

- There are some questions which have functions with discrete valued domains (such as day, month, year etc).
- For NAT type questions, enter only one right answer even if you get multiple answers for that particular question.
- Notations:
 - $\mathbb{R}$ = Set of real numbers
 - $\mathbb{Q}$ = Set of rational numbers
 - $\mathbb{Z}$ = Set of integers
 - $\mathbb{N}$ = Set of natural numbers
- The set of natural numbers includes 0.

Options :

6406536625594. ✓ Instructions has been mentioned above.

6406536625595. ✗ This Instructions is just for a reference & not for an evaluation.

Sub-Section Number : 2

Sub-Section Id : 640653373353

Question Shuffling Allowed : Yes

Question Number : 3 Question Id : 6406532034610 Question Type : SA Keyboard Layout : Inscript

Correct Marks : 5

Question Label : Short Answer Question

Let f be a function with domain $(-\infty, 9]$ and let

$$g(x) = x^2 - 6x + 5.$$

Let $[a, b] \subset \mathbb{R}$ be the largest closed interval such that the composite function $(f \circ g)(x)$ is well-defined for all $x \in [a, b]$.

Determine the value of $a + b$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

6

Sub-Section Number : 3

Sub-Section Id : 640653373354

Question Shuffling Allowed : Yes

Question Number : 4 **Question Id :** 6406532034611 **Question Type :** MSQ

Correct Marks : 4 **Max. Selectable Options :** 0

Question Label : Multiple Select Question

Select all correct option(s).

Options :

6406536625597. ✓ If g is odd and f is even, then $f \circ g$ is even.

6406536625598. ✓ If $f : \mathbb{R} \rightarrow \mathbb{R}$ is a strictly decreasing bijection, then f^{-1} is strictly decreasing.

6406536625599. ✗ The function $h : \mathbb{N} \rightarrow \mathbb{N}$ defined by

$$h(0) = 2, h(1) = 2, h(2) = 3, h(n) = n \text{ for } n \geq 3$$

is one-one but not onto.

6406536625600. ✓ There exist functions $g : A \rightarrow B$ and $f : B \rightarrow C$ such that g is one-one but not onto, f is onto but not one-one, and $f \circ g$ is onto.

Question Number : 5 **Question Id :** 6406532034612 **Question Type :** MSQ

Correct Marks : 4 **Max. Selectable Options :** 0

Question Label : Multiple Select Question

Let

$$f(x) = \frac{4x - 1}{x + 3}, \quad x \in \mathbb{R} \setminus \{-3\}.$$

Let $g = f^{-1}$ denote the inverse of f . Select all correct option(s).

Options :

6406536625601. ✓ $g(x) = \frac{1 + 3x}{4 - x}$

6406536625602. ✗ $g(x) = \frac{3x - 1}{4 - x}$

6406536625603. ✓ The domain of g is $\mathbb{R} \setminus \{4\}$

6406536625604. ✗ The range of g is $\mathbb{R} \setminus \{-3\}$

Sub-Section Number :

4

Sub-Section Id :

640653373355

Question Shuffling Allowed :

No

Question Id : 6406532034613 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Question Numbers : (6 to 7)

Question Label : Comprehension

Consider the functions

$$f(x) = \log_2(\log_3(\log_5 x)) \quad \text{and} \quad g(x) = -x^2 + 10x + 100.$$

Let $h(x)$ be a function defined as

$$h(x) := (f \circ g)(x)$$

on its domain.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 6 Question Id : 6406532034614 Question Type : SA Keyboard Layout : Inscript

Correct Marks : 2

Question Label : Short Answer Question

Find the maximum value of $g(x)$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

125

Question Number : 7 Question Id : 6406532034615 Question Type : SA Keyboard Layout : Inscript

Correct Marks : 3

Question Label : Short Answer Question

Find the maximum value of $h(x)$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0

Sub-Section Number : 5

Sub-Section Id : 640653373356

Question Shuffling Allowed : Yes

Question Number : 8 Question Id : 6406532034616 Question Type : SA Keyboard Layout : Inscript

Correct Marks : 4

Question Label : Short Answer Question

Solve for x in the equation $\log_2(x - 1) + \log_2(x - 3) = 3$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

5

Question Number : 9 Question Id : 6406532034619 Question Type : SA Keyboard Layout : Inscript

Correct Marks : 4

Question Label : Short Answer Question

Find the value of the constant $a \in \mathbb{R}$ for which the following equation holds.

$$\lim_{x \rightarrow 0} \frac{e^{ax} - 1}{\sin(2x)} = -4$$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

-8

Question Number : 10 Question Id : 6406532034621 Question Type : SA Keyboard Layout : Inscript

Correct Marks : 4

Question Label : Short Answer Question

Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be the function defined by

$$f(x) = \begin{cases} \frac{a}{x} \sin x + \cos x & , \text{ if } x < 0 \\ b & , \text{ if } x = 0 \\ x \cos\left(\frac{1}{x}\right) + 3 & , \text{ if } x > 0 \end{cases}$$

where $a, b \in \mathbb{R}$. Find the value of a for which f is continuous at $x = 0$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

2

Sub-Section Number :

6

Sub-Section Id :

640653373357

Question Shuffling Allowed :

Yes

Question Number : 11 Question Id : 6406532034617 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Let $a > 0, a \neq 1$. If

$$\log_x a + 2 \log_a(x^2) = 5,$$

then the possible value of x is:

Options :

6406536625608. ✖ $a^{-1/4}$

6406536625609. ✖ $a^{1/2}$

6406536625610. ✔ $a^{1/4}$

6406536625611. ✖ $a^{-1/2}$

Sub-Section Number :

7

Sub-Section Id :

640653373358

Question Shuffling Allowed :

Yes

Question Number : 12 Question Id : 6406532034618 Question Type : SA Keyboard Layout : Inscript

Correct Marks : 3

Question Label : Short Answer Question

Evaluate

$$\lim_{n \rightarrow \infty} \frac{2n^3 + 3n^2 - 4}{-n^3 + 4n + 1}.$$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

-2

Sub-Section Number :

8

Sub-Section Id :

640653373359

Question Shuffling Allowed :

Yes

Question Number : 13 Question Id : 6406532034620 Question Type : MSQ

Correct Marks : 5 Max. Selectable Options : 0

Question Label : Multiple Select Question

Suppose f is strictly increasing and g is strictly decreasing. Assume there exists $x_0 \in \mathbb{R}$ such that $f(x_0) = g(x_0)$.

Select all correct option(s).

Options :

6406536625614. ✓ $f(x) \geq g(x)$ for all $x \geq x_0$.

6406536625615. ✗ There exists $x_1 > x_0$ such that $f(x_1) = g(x_1)$.

6406536625616. ✗ $g(x) \geq f(x)$ for all $x \geq x_0$.

6406536625617. ✓ $g(x) \geq f(x)$ for all $x \leq x_0$.

6406536625618. ✗ $f(x) \geq g(x)$ for all $x \leq x_0$.

Question Number : 14 Question Id : 6406532034622 Question Type : MSQ

Correct Marks : 5 Max. Selectable Options : 0

Question Label : Multiple Select Question

Suppose $f : \mathbb{R} \rightarrow \mathbb{R}$ is a function that is differentiable at $x_0 \in \mathbb{R}$. Let L_{x_0} denote the tangent line to the graph of f at $x = x_0$. Which of the following statements are true?

Options :

6406536625620. ✓ L_{x_0} passes through the point $(x_0, f(x_0))$.

6406536625621. ✗ L_{x_0} has slope equal to $f(x_0)$.

6406536625622. ✗ L_{x_0} cannot be parallel to the x -axis.

6406536625623. ✓ L_{x_0} cannot be parallel to the y -axis.

Sub-Section Number : 9

Sub-Section Id : 640653373360

Question Shuffling Allowed : Yes

Question Number : 15 Question Id : 6406532034623 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be the function defined by $f(x) = x|x|$, for all $x \in \mathbb{R}$. Which of the following statement is true?

Options :

6406536625624. ✗

f is neither continuous nor differentiable.

6406536625625. ✖ f is continuous but not differentiable.

6406536625626. ✖ f is not continuous but differentiable.

6406536625627. ✔ f is continuous and differentiable.