

Notations :

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

Question Paper Name :	IIT M FOUNDATION FN EXAM QDF2 13 Apr 2025
Subject Name :	2025 Apr13: IIT M FN EXAM QDF2
Creation Date :	2025-04-08 21:09:00
Duration :	180
Total Marks :	885
Display Marks:	Yes
Share Answer Key With Delivery Engine :	Yes
Actual Answer Key :	Yes
Calculator :	Scientific
Magnifying Glass Required? :	No
Ruler Required? :	No
Eraser Required? :	No
Scratch Pad Required? :	No
Rough Sketch/Notepad Required? :	No
Protractor Required? :	No
Show Watermark on Console? :	Yes
Highlighter :	No
Auto Save on Console?	Yes
Change Font Color :	No
Change Background Color :	No
Change Theme :	No
Help Button :	No
Show Reports :	No
Show Progress Bar :	No

Group I

Group Number :	1
Group Id :	64065325398
Group Maximum Duration :	0
Group Minimum Duration :	90

Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	885
Is this Group for Examiner? :	No
Examiner permission :	Cant View
Show Progress Bar? :	No
Revisit allowed for group Instructions? :	Yes
Maximum Instruction Time :	0
Minimum Instruction Time :	0
Group Time In :	Minutes
Revisit Section :	Yes
Action on Revisit Section :	View and Edit
Navigate To Group Summary From Last Question? :	No
Disable Submit Button During Assessment? :	No
Section Selection Time? :	0
No of Optional sections to be attempted :	0

Sem1 CT

Section Id :	64065386890
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	18
Number of Questions to be attempted :	18
Section Marks :	100
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653189482
Question Shuffling Allowed :	No

Question Number : 1 Question Id : 6406531230059 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : SEMESTER I:
COMPUTATIONAL THINKING (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 :

6406534156555. ✓ YES

6406534156556. ✗ NO

Question Number : 2 Question Id : 6406531230060 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

Scores

SeqNo	Name	Gender	DateOfBirth	TownCity	Mathematics	Physics	Chemistry	Total
0	Bhuvanesh	M	7 Nov	Erode	68	64	78	210
29	Naveen	M	13 Oct	Vellore	72	66	81	219

Words

SeqNo	Word	PartOfSpeech	LetterCount
0	It	Pronoun	2
64	cane.	Noun	4

Library

SeqNo	Name	Author	Genre	Language	Pages	Publisher	Year
0	Igniting Minds	Kalam	Nonfiction	English	178	Penguin	2002
29	Malgudi Days	Narayan	Fiction	English	150	Indian Thought	1943

Olympics

SeqNo	Name	Gender	Nationality	Host country	Year	Sport	Medal
0	Karnam Malleswari	F	Indian	Australia	2000	Weightlifting	Bronze
49	Michael Phelps	M	American	China	2008	Swimming	Gold

Three sample cards out of 30 for Shopping Bills dataset

Item List {

SV Stores		Srivatsan 1	
Item	Category	Qty	Price
Carrots	Vegetables/Food	1.5	50
Soap	Toiletries	4	32
Tomatoes	Vegetables/Food	2	40
Bananas	Vegetables/Food	8	64
Socks	Footwear/Apparel	3	168
Curd	Dairy/Food	0.5	32
Milk	Dairy/Food	1.5	36
		567	

Sun General		Vignesh 11	
Item	Category	Qty	Price
Phone Charger	Utilities	1	230
Razor Blades	Grooming	1	12
Razor	Grooming	1	45
Shaving Lotion	Grooming	0.8	144
Earphones	Electronics	1	210
Pencils	Stationery	3	15
		656	

Big Bazaar		Sudeep 2	
Item	Category	Qty	Cost
Baked Beans	Canned/Food	1	125
Chicken Wings	Meat/Food	0.5	300
Cocoa powder	Canned/Food	1	160
Capsicum	Vegetables/Food	0.8	144
Tie	Apparel	2	780
Clips	Household	0.5	16
		1525	

Options :

6406534156557. ✓ Useful Data has been mentioned above.

6406534156558. ✗ This data attachment is just for a reference & not for an evaluation.

Sub-Section Number :

2

Sub-Section Id :

640653189483

Question Shuffling Allowed :

Yes

Question Number : 3 Question Id : 6406531230061 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

The following pseudocode is executed using the "Words" dataset. Let **unique(L)** return the list of unique elements of **L**. What will **wCount** represent at the end of the execution of the pseudocode? Ignore the upper and lower case, and punctuation symbols while comparing with other words.

```
1 wList = [], uniqueList = []
2 wCount = {}
3 while(Table 1 has more rows){
4     Read the first row X from Table 1
5     wList = wList ++ [X.Word]
6     if(X.Word ends with a full stop){
7         uniqueList = unique(wList)
8         foreach word in uniqueList{
9             if(isKey(wCount, word)){
10                 wCount[word] = wCount[word] + 1
11             }
12         else{
13             wCount[word] = 1
14         }
15     }
16     wList = []
17 }
18 Move X to table 2
19 }
```

Options :

6406534156559. ✓ Dictionary with words as keys mapped to the number of sentences in which the word is present.

6406534156560. ✗ Dictionary with words as keys mapped to the frequency count of the word in the dataset.

6406534156561. ✗ Dictionary with words as keys mapped to the maximum frequency of the word in a sentence.

6406534156562. ✗ Dictionary with words as keys mapped to the number of sentences in which the word is present more than one time.

Question Number : 4 Question Id : 6406531230062 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

The following pseudocode is executed using the "Scores" table. What will the values of **A** and **B** represent at the end of the execution?

```
1 D = {}
2 while(Table 1 has more rows){
3     Read the first row X in Table 1
4     if(isKey(D, X.Town/City)){
5         if(D[X.Town/City] < X.Mathematics){
6             D[X.Town/City] = X.Mathematics
7         }
8     }
9     else{
10        D[X.Town/City] = X.Mathematics
11    }
12    Move X to Table 2
13 }
14 A = 0, B = 0
15 foreach Y in keys(D){
16     if(B == D[Y]){
17         A = A + 1
18     }
19     if(B < D[Y]){
20         A = 1
21         B = D[Y]
22     }
23 }
```

Options :

6406534156563. ✓ **A** = Number of cities where students score the highest marks in Mathematics
B = The highest marks in Mathematics

6406534156564. ✗ **A** = Number of cities where students score the lowest marks in Mathematics
B = The highest marks in Mathematics

6406534156565. ✗ **A** = Cities where students score the lowest marks in Mathematics
B = The lowest marks in Mathematics

6406534156566. ✗ **A** = Number of cities with the highest Mathematics scores
B = The lowest marks in Mathematics

Question Number : 5 Question Id : 6406531230065 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

Consider the following pseudocode. Assume that **a** and **b** are two positive integers.

```
1 Procedure calculate(a, b)
2     diff = 0
3     if(a < b){
4         return(calculate(b, a))
5     }
6     if(a == b){
7         return(b)
8     }
9     diff = a - b
10    if(diff > b){
11        return(calculate(diff, b))
12    }
13    else{
14        return(calculate(b, diff))
15    }
16 End calculate
```

What is the return value of **calculate(20, 6)**?

Options :

6406534156575. ✘ 0

6406534156576. ✓ 2

6406534156577. ✘ 4

6406534156578. ✘ 6

Question Number : 6 Question Id : 6406531230066 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

The following pseudocode is executed using the "Scores" dataset.

```
1  topperDict = {}
2  while(Table 1 has more rows){
3      Read the first row x in Table 1
4      if(isKey(topperDict, x.city)){
5          if(topperDict[x.city]["Total"] < x.Total){
6              topperDict[x.city] = {"Name": x.Name, "Total": x.Total}
7          }
8      }
9      else{
10         topperDict[x.city] = {"Name": x.Name, "Total": x.Total}
11     }
12     Move x to Table 2
13 }
```

At the end of execution, what does **topperDict** represent?

Options :

6406534156579. ✓ A dictionary where each city maps to the highest total marks scored and the corresponding student's name.

6406534156580. ✗ A dictionary where each city maps to the lowest total marks scored and the corresponding student's name.

6406534156581. ✗ A dictionary where each city maps to the lowest total marks recorded in that city.

6406534156582. ✗ None of these

Sub-Section Number : 3

Sub-Section Id : 640653189484

Question Shuffling Allowed : Yes

Question Number : 7 Question Id : 6406531230063 Question Type : MCQ

Correct Marks : 6

Question Label : Multiple Choice Question

Consider a graph generated from the "Scores" table that is represented by a **matrix B**. Each node in the graph corresponds to a student from the table. **SeqNo** is used to label the nodes in the graph. Study the given pseudocode and answer. There is an edge between students **i** and **j**, with $i \neq j$, if and only if:

```
1 A = []
2 while(Table 1 has more rows){
3     Read the first row X in Table 1
4     A[X.SeqNo] = [X.cityTown, X.Gender]
5     Move X to Table 2
6 }
7 n = length(keys(A))
8 B = createMatrix(n, n)
9 foreach i in keys(A){
10     foreach j in keys(A){
11         if(i != j and isRelated(A[i], A[j])){
12             B[i][j] = 1
13         }
14     }
15 }
16 Procedure isRelated(x, y)
17     if(first(x) == first(y) and last(x) != last(y)){
18         return(True)
19     }
20     else{
21         return(False)
22     }
23 End isRelated
```

Options :

6406534156567. ❌ they are from different cities/towns

6406534156568. ❌ they have the same gender

6406534156569. ❌ they are from the same cities/towns or have the same gender

6406534156570. ✓ they are from the same cities/towns but have different genders

Question Number : 8 Question Id : 6406531230064 Question Type : MCQ

Correct Marks : 6

Question Label : Multiple Choice Question

The following pseudocode is executing using the "Scores" table. At the end of the execution, **matrix** represents the adjacency matrix of the graph generated from the "Scores" table.

```
1 D = {}
2 while(Table 1 has more rows){
3     Read the first row X in Table 1
4     D[X.SeqNo] = {"P": X.Physics, "C": X.Chemistry, "M": X.Mathematics}
5     Move X to Table 2
6 }
7 matrixPh = getAdjMatrix(D, "P")
8 matrixCh = getAdjMatrix(D, "C")
9 matrixMa = getAdjMatrix(D, "M")
10
11 Procedure getAdjMatrix(D, subject)
12     n = length(keys(D))
13     matrix = createMatrix(n, n)
14     foreach i in rows(matrix){
15         foreach j in columns(matrix){
16             if(i != j){
17                 diff = D[i][subject] - D[j][subject]
18                 if(20 <= diff and diff <= 30){
19                     matrix[i][j] = 1
20                 }
21             }
22         }
23     }
24     return(matrix)
25 End getAdjMatrix
```

If **matrixCh[i][j] = 1**, then

Options :

- 6406534156571. ✘ j scored at most 20 and at least 30 more marks in Chemistry than i
- 6406534156572. ✘ i scored at most 20 and at least 30 more marks in Chemistry than j
- 6406534156573. ✓ i scored at least 20 and at most 30 more marks in Chemistry than j
- 6406534156574. ✘ j scored at least 20 and at most 30 more marks in Chemistry than i

Sub-Section Number :

4

Sub-Section Id :

640653189485

Question Shuffling Allowed :

Yes

Question Number : 9 Question Id : 6406531230067 Question Type : MSQ

Correct Marks : 5 Max. Selectable Options : 0

Question Label : Multiple Select Question

The following pseudocode is executed using the "Words" dataset. Assume that the rows in the table are sorted in the ascending order of sequence number. What does **outList** represent at the end of execution?

```
1 start = True
2 outList = []
3 while(Table 1 has more rows){
4     Read the first row X in Table 1
5     if(start){
6         inList = []
7         start = False
8     }
9     if(X.Partofspeech != "noun"){
10        inList = inList ++ [X.word, X.Partofspeech]
11    }
12    if(X.word ends with a full stop){
13        outList = outList ++ [inList]
14        start = True
15    }
16
17    Move X to Table 2
18 }
```

Options :

6406534156583. ✓ **outList** represents a list of lists

6406534156584. ✓ Each element in **outList** represents a list containing words and their parts of speech from a sentence except for the nouns

6406534156585. ✗ Each element in **outList** corresponds to one character from the paragraph

6406534156586. ✗ Each element in **outL ist** represents the words from a sentence that have part of speech 'noun'

Question Number : 10 Question Id : 6406531230070 Question Type : MSQ

Correct Marks : 5 Max. Selectable Options : 0

Question Label : Multiple Select Question

The following pseudocode is executed using the "Library" dataset. At the end of the execution, A stores a dictionary with the author's name as key and the number of books written by him/her as its value. But the code may have mistakes. Identify all such mistakes (if any). Assume that all statements not listed in the options below are free of errors.

```
1 | A = []
2 | while(Table 1 has more rows){
3 |     Read the first row X from Table 1
4 |     if(isKey(A, X.Author)){
5 |         A[X.Author] = 1
6 |     }
7 |     else{
8 |         A[X.Author] = A[X.Author] + 1
9 |     }
10|     Move X to Table 2
11| }
```

Options :

Replacing the condition given in line 4 with the statement given below will provide the correct result.

```
1 | if(not isKey(A, X.Author))
```

6406534156595. ✓

Replacing the statements given from line 4 to 9 with the statements given below will provide the correct result.

```
1 | if(not isKey(A, X.Author)){
2 |     A[X.Author] = 1
3 | }
4 | A[X.Author] = A[X.Author] + 1
```

6406534156596. ✘

6406534156597. ✓ Interchanging Line 5 and 8 will provide the correct result.

Replacing the statements given from line 4 to 9 with the statements given below will provide the correct result.

```
1 | if(not isKey(A, X.Author)){
2 |     A[X.Author] = 0
3 | }
4 | else{
5 |     A[X.Author] = A[X.Author] + 1
6 | }
7 |
```

6406534156598. ✘

Sub-Section Number :	5
Sub-Section Id :	640653189486
Question Shuffling Allowed :	Yes

Question Number : 11 Question Id : 6406531230068 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Let **D** be a non-empty dictionary defined as:

D = { "x": [10, 20, 30], "y": [5, 15, 25], "z": { "a": 100, "b": 200 }, "w": "a" }

Choose the correct option(s). It is a Multiple Select Question (MSQ).

Options :

6406534156587. ✓ The expression **first(D["x"]) + last(D["y"])** evaluates to **35**.

6406534156588. ✗ The expression **init(D["z"])** returns **"a":100**.

6406534156589. ✓ The expression **length(keys(D))** returns **4**.

6406534156590. ✗ The expression **first(rest(D["x"]))** returns **30**.

Sub-Section Number :	6
Sub-Section Id :	640653189487
Question Shuffling Allowed :	Yes

Question Number : 12 Question Id : 6406531230069 Question Type : MSQ

Correct Marks : 6 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the procedure **findSomething**, that accepts a non-empty list of integers **L** as input.

```

1 Procedure findsomething(L)
2     if(length(L) == 1){
3         return(first(L))
4     }
5     else{
6         if(first(L) > last(L)){
7             return(findsomething(init(L)))
8         }
9         else{
10            return(findsomething(rest(L)))
11        }
12    }
13 End findsomething

```

Choose the correct option(s).

Options :

When L = [4, 7, 2, 9, 1], the output of findSomething(L) is 9.

6406534156591. ✓

6406534156592. ✘ When L = [4, 7, 2, 9, 1], the output of findSomething(L) is 1.

If we replace lines 6-11 with the below code, procedure will return the same output.

```
1 | if(first(L) < last(L)){
2 |     return(findsomething(rest(L)))
3 | }
4 | else{
5 |     return(findsomething(init(L)))
6 | }
```

6406534156593. ✓

If we replace lines 6-11 with the below code, procedure will return the same output.

```
1 | if(first(L) < last(L)){
2 |     return(findsomething(init(L)))
3 | }
4 | else{
5 |     return(findsomething(rest(L)))
6 | }
```

6406534156594. ✘

Sub-Section Number :

7

Sub-Section Id :

640653189488

Question Shuffling Allowed :

Yes

Question Number : 13 Question Id : 6406531230071 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

Let **Z** be a row in the "Words" table such that **Z.Word = "balloon"**. What will be the value of **alphaDict['l']** at the end of the execution of the following pseudocode?

```
1 Procedure updateDict(z, Dict)
2 i = 1
3 while(i <= z.LetterCount){
4     x = ith letter of z.Word
5     if(not isKey(Dict, x)){
6         Dict[x] = 1
7     }
8     else{
9         Dict[x] = Dict[x] + 1
10    }
11    i = i + 1
12 }
13 return(Dict)
14 End updateDict
15
16 alphaDict = {'l': 1, 'b': 2, 'o': 1, 'n': 1}
17 alphaDict = updateDict(z, alphaDict)
18
```

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

3

Question Number : 14 Question Id : 6406531230072 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

What will the value of **S** be at the end of the execution of the following pseudocode?

```
1 L = [4, -2, 3, 1]
2 S = calculateSum(L)
3
4 Procedure calculateSum(x)
5     if(length(x) == 0){
6         return(0)
7     }
8     if(length(x) == 1){
9         return(first(x))
10    }
11    return(first(x) * last(x) + calculateSum(rest(init(x))))
12 End calculateSum
```

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 : 640653189489

Question Shuffling Allowed : No

Question Id : 6406531230073 **Question Type :** COMPREHENSION **Sub Question Shuffling**

Allowed : No **Group Comprehension Questions :** No **Question Pattern Type :** NonMatrix

Question Numbers : (15 to 16)

Question Label : Comprehension

The following pseudocode is executed using the "Shopping Bills" dataset.

```
1 itemD = {}, costD = {}
2 while(Pile 1 has more cards){
3     Read the top card X in Pile 1
4     itemD = updateDict(itemD, X)
5     Move X to Pile 2
6 }
7
8 foreach i in keys(itemD){
9     B = 0, items = []
10    foreach j in keys(itemD[i]){
11        if(itemD[i][j] == B){
12            items = items ++ [j]
13        }
14        if(itemD[i][j] > B){
15            B = itemD[i][j]
16            items = [j]
17        }
18    }
19    costD[i] = items
20 }
21
22 Procedure updateDict(D, Y)
23     if(not isKey(D, Y.ShopName)){
24         D[Y.ShopName] = {}
25     }
26     foreach A in Y.ItemList{
27         if(isKey(D[Y.ShopName], A.Item)){
28             D[Y.ShopName][A.Item] = D[Y.ShopName][A.Item] + A.Cost
29         }
30         else{
31             D[Y.ShopName][A.Item] = A.Cost
32         }
33     }
34     return(D)
35 End updateDict
```

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 15 Question Id : 6406531230074 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

What will **itemD[i][j]** represent?

Options :

6406534156601. ✓ Revenue generated by item **j** for shop **i**

6406534156602. ✗ Revenue generated by item **i** for shop **j**

6406534156603. ✗ Cost of item **i** in shop **j**

6406534156604. ✗ Cost of item **j** in shop **i**

Question Number : 16 Question Id : 6406531230075 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

What will **costD[i]** represent at the end of the execution?

Options :

6406534156605. ✓ List of item(s) which generated highest revenue for shop **i**

6406534156606. ✗ List of item(s) which generated lowest revenue for shop **i**

6406534156607. ✗ List of cost of most sold item(s) in shop **i**

6406534156608. ✗ List of cost of least sold item(s) in shop **i**

Sub-Section Number : 9

Sub-Section Id : 640653189490

Question Shuffling Allowed : No

Question Id : 6406531230076 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (17 to 18)

Question Label : Comprehension

The following table contains information regarding books in a library. Each entry in the table corresponds to a book and is authored by at least two authors. There is a pool of **n** authors, each author being assigned a unique index between 0 and **n – 1**. There are **M** books in total.

S.No.	Authors List
0	[0, 2, 3]
...	...
M-1	[1, 5, 8, n-1]

The table is represented by a dictionary named **books**, with the keys as serial numbers and values as the corresponding list of authors. Assume that **books** has already been computed. For example, we have: **books[0] = [0, 2, 3]**.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 17 Question Id : 6406531230077 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

The following pseudocode generates a graph G from **books**. Each node corresponds to an author. There is an edge between two different authors **j** and **k** if they have co-authored a book, and the edge is labeled with the number of books they have co-authored. Choose the correct code fragment to complete the following pseudocode.

```
1 matrix = createMatrix(n, n)
2 foreach i in keys(books){
3     foreach j in books[i]{
4         foreach k in books[i]{
5             *****
6             *** Fill the code ***
7             ****
8         }
9     }
10 }
```

Options :

```
1 | matrix[j][k] = matrix[j][k] + 1
```

6406534156609. ❌

```
1
2 if(j != k){
3     matrix[j][k] = matrix[j][k] + 1
4 }
```

6406534156610. ✓

```
1 if(j != k){
2     matrix[j][k] = matrix[j][k] + 1
3     matrix[k][j] = matrix[k][j] + 1
4 }
```

6406534156611. ❌

```
1 | matrix[j][k] = matrix[j][k] + 1
2 | matrix[k][j] = matrix[k][j] + 1
```

6406534156612. ❌

Question Number : 18 Question Id : 6406531230078 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

The following pseudocode creates adjacency matrix **matrix2** of another graph H from **books**. For two different authors **j** and **k**, what does the value **matrix2[j][k]** represent at the end of the execution?

```

1 matrix2 = createMatrix(n, n)
2 foreach j in rows(matrix2){
3     foreach k in columns(matrix2){
4         matrix2[j][k] = []
5     }
6 }
7 foreach i in keys(books){
8     foreach j in book[i]{
9         foreach k in books[i]{
10            foreach h in books[i]{
11                if(j != k and j != h and k != h and not member(matrix2[j]
12 [k], h)){
13                    matrix2[j][k] = matrix2[j][k] ++ [h]
14                    matrix2[k][j] = matrix2[k][j] ++ [h]
15                }
16            }
17        }
18    }
}

```

Options :

6406534156613. ✓ List of authors who have co-authored a book with both **j** and **k**
6406534156614. ✗ List of authors who have co-authored a book with either **j** or **k**
6406534156615. ✗ List of authors who have co-authored at least two book with both **j** and **k**
6406534156616. ✗ List of authors who have co-authored at least two book with either **j** or **k**

Question Id : 6406531230079 Question Type : COMPREHENSION Sub Question Shuffling

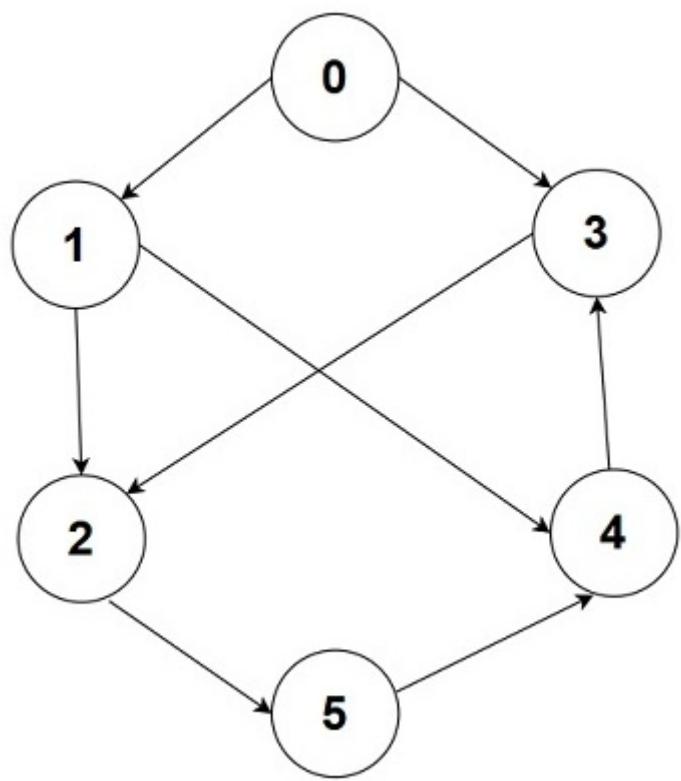
Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (19 to 20)

Question Label : Comprehension

Let **M** be an adjacency matrix of a graph **G** given below, where **M[i][j]** = 1 if there is an edge from **i** to **j**, otherwise 0.

ListV represents the list of vertices of the graph **G**.



Based on the above data, answer the given subquestions.

Sub questions

Question Number : 19 Question Id : 6406531230080 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

Consider the below pseudocode

```
1 Procedure updateMatrix(M)
2     tempMat = M
3     foreach i in ListV{
4         foreach j in ListV{
5             foreach k in ListV{
6                 if(M[i][j] == 1 and M[j][k] == 1){
7                     foreach l in ListV{
8                         if(M[k][l] == 1){
9                             tempMat[i][l] = 1
10                        }
11                    }
12                }
13            }
14        }
15    }
16    return(tempMat)
17 End updateMatrix
```

What will the values of **p** and **q** be at the end of execution of pseudocode given below?

```
1 newMatrix = updateMatrix(M)
2 p = newMatrix[3][5]
3 q = newMatrix[0][5]
```

Options :

6406534156617. ✘ p = 0, q = 0

6406534156618. ✘ p = 1, q = 0

6406534156619. ✓ p = 0, q = 1

6406534156620. ✘ p = 1, q = 1

Question Number : 20 Question Id : 6406531230081 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

Consider the below pseudocode.

```
1 Procedure updateMatrix(M)
2     count = 0
3     tempMat = M
4     foreach i in ListV{
5         foreach j in ListV{
6             foreach k in ListV{
7                 if(M[i][j] == 1 and M[j][k] == 1){
8                     foreach l in ListV{
9                         if(M[k][l] == 1 and M[l][i]== 1){
10                            count = count + 1
11                        }
12                    }
13                }
14            }
15        }
16    }
17    return(count)
18 End updateMatrix
```

What will be the value of **count** at the end of the execution?

Options :

6406534156621. ✘ 1

6406534156622. ✘ 2

6406534156623. ✘ 3

6406534156624. ✓ 4

Question Id : 6406531230082 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (21 to 22)

Question Label : Comprehension

The following pseudocode is executed using the “Scores” dataset. Two students form a study pair if their difference in Mathematics marks are at most 10. Assume that Pile P1 is always restored back after calling **studyPair(Pile P1)**.

```

1 count1 = studyPair(Pile 1)
2 while(Pile 1 has more cards){
3     Read the top card X in Pile 1
4     if(x.cityTown == "Chennai"){
5         Move X to Pile CHN
6     }
7     if(x.cityTown == "Bengaluru"){
8         Move X to Pile BLR
9     }
10    if(x.cityTown == "Vellore"){
11        Move X to Pile VLR
12    }
13 }
14 count2 = studyPair(Pile CHN) + studyPair(Pile BLR) + studyPair(Pile VLR)
15 count3 = count1 - count2
16
17 Procedure studyPair(Pile P1)
18     A = 0
19     while(Pile P1 has more cards){
20         Read the first card in Pile P1
21         Move X to Pile P2
22         while(Pile P1 has more cards){
23             Read the top card in Pile P1
24             Move Y to Pile P3
25             if(-10 <= X.Mathematics - Y.Mathematics <= 10){
26                 A = A + 1
27             }
28         }
29         Move all cards from Pile P3 to Pile P1
30     }
31     return(A)
32 End studyPair

```

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 21 Question Id : 6406531230083 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

What will **count1** represent at the end of execution?

Options :

6406534156625. ✓ Number of study pairs

6406534156626. ✗ Number of pairs of study pair

6406534156627. ✗ Number of students who formed study pairs

6406534156628. ✗ Number of study pairs from the same city

Question Number : 22 Question Id : 6406531230084 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

What will **count3** represent at the end of execution?

Options :

6406534156629. ❌ Number of study pairs where at least one student in the pair is not from the cities Chennai, Bengaluru, and Vellore

6406534156630. ✓ Number of study pairs where both students in the pair are not from the same city among Chennai, Bengaluru and Vellore

6406534156631. ❌ Number of study pairs where both students in the pair are from the same city among Chennai, Bengaluru and Vellore

6406534156632. ❌ None of these

Sem1 Maths1

Section Id :	64065386891
Section Number :	2
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
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653189491
Question Shuffling Allowed :	No

Question Number : 23 Question Id : 6406531230085 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : SEMESTER I: 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 :

6406534156633. ✓ YES

6406534156634. ✗ NO

Question Number : 24 Question Id : 6406531230086 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 :

6406534156635. ✓ Instructions has been mentioned above.

6406534156636. ✗ This Instructions is just for a reference & not for an evaluation.

Sub-Section Number :	2
Sub-Section Id :	640653189492
Question Shuffling Allowed :	Yes

Question Number : 25 Question Id : 6406531230087 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Which of the following statements is/are true about the function $f(x) = \ln(\ln(x))$?

Options :

6406534156637. ✓ f is one-one in its domain.

6406534156638. ❌ f has no inverse in its domain.

6406534156639. ❌ f is a decreasing function in its domain.

6406534156640. ❌ The domain of f is $(0, \infty)$

Sub-Section Number : 3

Sub-Section Id : 640653189493

Question Shuffling Allowed : Yes

Question Number : 26 Question Id : 6406531230088 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Which of the following options is true?

Options :

6406534156641. ❌ The minimum cost-spanning tree obtained by Prim's Algorithm is always the same as obtained by Kruskal's Algorithm.

6406534156642. ❌ The minimum cost-spanning tree is not a tree.

6406534156643. ✓ The cost of the spanning tree obtained by Prim's Algorithm is the same as obtained by Kruskal's Algorithm.

6406534156644. ❌ If the weight of each edge in a graph is equal, then the total cost of the graph is equal to the cost of the minimum cost-spanning tree.

Sub-Section Number : 4

Sub-Section Id : 640653189494

Question Shuffling Allowed : Yes

Question Number : 27 Question Id : 6406531230089 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements is (are) correct?

Options :

6406534156645. ✓ $y - 20 = -3(x - 10)^2$ is an equation of a parabola whose vertex is at $(10, 20)$.

6406534156646. ✓ $p(x) = ax^{10} + bx^5 + 2x + 8$ where $a = 0$ and $b \neq 0$, is a polynomial of degree 5.

6406534156647. ❌ $-5x + 4y - 1 = 0$ and $\frac{x}{4} - \frac{y}{5} - 1 = 0$ are perpendicular to each other.

6406534156648. ✓ $2x + 7y + 9 = 0$ and $6x + 21y + 9 = 0$ are parallel to each other.

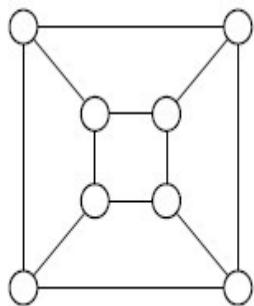
Sub-Section Number :	5
Sub-Section Id :	640653189495
Question Shuffling Allowed :	Yes

Question Number : 28 Question Id : 6406531230090 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Suppose G be a graph, as shown in the below figure. Let V be the set of vertices of G , V_i be the maximum independent set and V_c be the minimum vertex cover. Which of the following is(are) true?



Options :

6406534156649. ✓ Cardinality of V_i is 4.

6406534156650. ✗ Cardinality of V_c is 3.

6406534156651. ✗ Cardinality of V_i is 5.

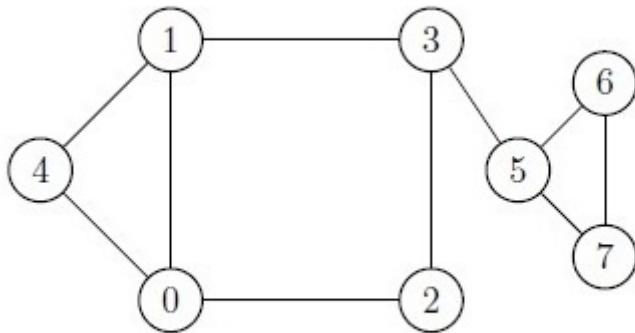
6406534156652. ✓ Cardinality of V_c is 4.

Question Number : 29 Question Id : 6406531230091 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the graph given below.



Which of the following options is(are) correct?

Options :

6406534156653. ✓ If we perform Breadth-First Search at node 0, then one of the possible orders in which the nodes will be visited is 01423567.

6406534156654. ✗ If we perform Depth First Search at node 0, then one of the possible order in which the nodes will be visited is 04123576

6406534156655. ✗ If we perform Breadth-First Search at node 0, then one of the possible orders in which the nodes will be visited is 01423765.

6406534156656. ✓ If we perform Depth First Search at node 0, then one of the possible orders in which the nodes will be visited is 04132567.

Sub-Section Number :

6

Sub-Section Id :

640653189496

Question Shuffling Allowed :

Yes

Question Number : 30 Question Id : 6406531230092 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Evaluate

$$\lim_{\substack{x \rightarrow \frac{\pi}{2} \\ -}} [\tan(x) - \sec(x)].$$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0

Sub-Section Number :

7

Sub-Section Id :

640653189497

Question Shuffling Allowed :

Yes

Question Number : 31 Question Id : 6406531230093 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

It is given that at $x = 1$, the function $f(x) = x^4 - 62x^2 + ax + 9$ attains its maximum value, in the interval $[0, 2]$. Find the value of a.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

120

Sub-Section Number : 8

Sub-Section Id : 640653189498

Question Shuffling Allowed : No

Question Id : 6406531230094 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (32 to 33)

Question Label : Comprehension

Find $\lim_{n \rightarrow \infty} a_n$ for the given sequences.

Based on the above data, answer the subquestions.

Sub questions

Question Number : 32 Question Id : 6406531230095 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

$\{a_n\}$ such that $a_n = \frac{15n^3 + 2n^2 - 1}{n^3 + 3n}$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

15

Question Number : 33 Question Id : 6406531230096 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

$$\{a_n\} \text{ such that } a_n = \frac{1}{8} + \frac{(-1)^n}{n}$$

Enter your answer correctly to two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.11 to 0.13

Sub-Section Number : 9

Sub-Section Id : 640653189499

Question Shuffling Allowed : No

Question Id : 6406531230097 **Question Type :** COMPREHENSION **Sub Question Shuffling Allowed :** No **Group Comprehension Questions :** No **Question Pattern Type :** NonMatrix

Question Numbers : (34 to 37)

Question Label : Comprehension

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

$$f(x) = \begin{cases} x^2 - |x|, & \text{if } x < 0, \\ x^2 + |x|, & \text{if } x \geq 0. \end{cases}$$

Answer the given sub-questions.

Sub questions

Question Number : 34 **Question Id :** 6406531230098 **Question Type :** MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

f is not differentiable at $x = 0$.

Options :

6406534156661. ✘ TRUE

6406534156662. ✓ FALSE

Question Number : 35 **Question Id :** 6406531230099 **Question Type :** MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

f is continuous at $x = 0$.

Options :

6406534156663. ✓ TRUE

6406534156664. ✗ FALSE

Question Number : 36 Question Id : 6406531230100 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

f is differentiable everywhere.

Options :

6406534156665. ✓ TRUE

6406534156666. ✗ FALSE

Question Number : 37 Question Id : 6406531230101 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

If l is the minimum value of the function
 f , then find the value of $8l$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

-2

Sub-Section Number : 10

Sub-Section Id : 640653189500

Question Shuffling Allowed : No

Question Id : 6406531230102 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (38 to 39)

Question Label : Comprehension

Consider a function defined as

$$f(x) = \begin{cases} x^3 + 5x + 1, & x \leq 0 \\ m \sin(x) + n \cos(x), & x > 0 \end{cases}$$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 38 Question Id : 6406531230103 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

If f is differentiable at $x = 0$, then the value of $m + n$ is

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

6

Question Number : 39 Question Id : 6406531230104 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Let f be a differentiable function at $x = 2$.

The tangent line to the curve represented by the function f at the point $(2, 6)$ passes through the point $(6, -18)$. What will be the value of $f'(2)$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

-6

Sub-Section Number : 11

Sub-Section Id : 640653189501

Question Shuffling Allowed : No

Question Id : 6406531230105 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (40 to 41)

Question Label : Comprehension

An arrow is shot horizontally off from a tower that is 80m high and follows a parabolic path. If the height(in m) from the ground with respect to time(in sec) follows the formula $h(t) = 80 - 5t^2$, then answer the given subquestions:

Sub questions

Question Number : 40 Question Id : 6406531230106 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

How much time(in sec) the arrow will take to reach the ground?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

4

Question Number : 41 Question Id : 6406531230107 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following options is/are true ?

Options :

6406534156671. ✓ The slope of the tangent line at $t = 2$ is -20

6406534156672. ✗ The linear approximation ($L_h(t)$) of the function $h(t)$ at $t = 2$ is $L_h(t) = 100 + 20t$.

6406534156673. ✓ The equation of the tangent line of the function $h(t)$ at $t = 3$ is $y = 125 - 30t$.

6406534156674. ✗ The linear approximation ($L_h(t)$) of the function $h(t)$ at $t = 2$ is $L_h(t) = 125 - 30t$.

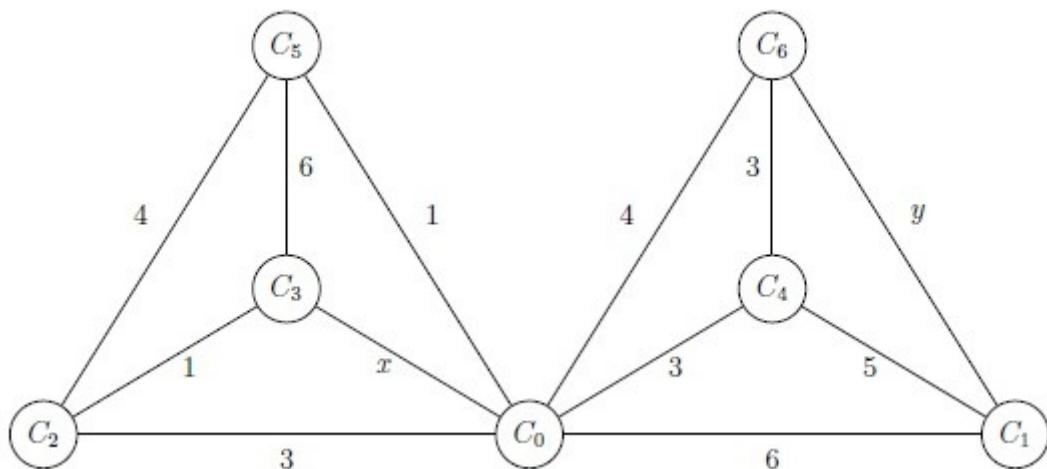
Question Id : 6406531230108 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (42 to 43)

Question Label : Comprehension

Suppose Nitya wishes to find the minimum cost spanning tree of the graph given below. While finding the minimum cost spanning tree she finds that a few edge weights are missing (x and y)

but she is sure that the weight of the minimum cost spanning tree is 15 in the graph.



Based on the above data, answer the given subquestions.

Sub questions

Question Number : 42 Question Id : 6406531230109 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following are possible values for x and y ?

Options :

6406534156675. ✓ $x = 2, y = 6$.

6406534156676. ✗ $x = 4, y = 3$.

6406534156677. ✓ $x = 3, y = 4$.

6406534156678. ✗ $x = 1, y = 6$.

Question Number : 43 Question Id : 6406531230110 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

What is the minimum number of colors required to properly color the vertices of the given graph such that no two adjacent vertices share the same color?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

4

Section Id :	64065386892
Section Number :	3
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	18
Number of Questions to be attempted :	18
Section Marks :	50
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653189502
Question Shuffling Allowed :	No

Question Number : 44 Question Id : 6406531230111 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : SEMESTER II:
INTRODUCTION TO PYTHON (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 :

6406534156680. ✓ YES

6406534156681. ✗ NO

Question Number : 45 Question Id : 6406531230112 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

Presentation

There are two types of blocks that you would see in all the questions:

Code

```
for i in range(10):
    if i % 2 == 0:
        print(i)
```

Input or Output

```
0
2
4
6
8
```

Useful information

range

Sample behaviour of the `range` function:

- `range(5)` corresponds to the sequence `0, 1, 2, 3, 4`
- `range(1, 5)` corresponds to the sequence `1, 2, 3, 4`
- `range(1, 1)` is the empty sequence

// operator

`//` is the floor division operator. `5 // 2` is 2 and *not* 2.5

NAT → integer

For all NAT questions in this exam, the answer will always be an integer and not a float value.

If the answer to a question is 18, then just enter that value. Do *not* enter 18.0

Options :

6406534156682. ✓ Useful Data has been mentioned above.

6406534156683. ❌ This data attachment is just for a reference & not for an evaluation.

Sub-Section Number :

2

Sub-Section Id :

640653189503

Question Shuffling Allowed :

Yes

Question Number : 46 Question Id : 6406531230113 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following Python function:

```
def tricky_transform(D, left, right):
    if left >= right:
        return

    if D[left] % 2 == 0:
        tricky_transform(D, left + 1, right)
    elif D[right] % 2 == 0:
        tricky_transform(D, left, right - 1)
    else:
        D[left], D[right] = D[right], D[left]
        tricky_transform(D, left + 1, right - 1)

lst = [2, 9, 4, 11, 6, 15, 3, 8]
tricky_transform(lst, 0, len(lst) - 1)
print(lst)
```

Which of the following best describes what `tricky_transform` does to the list `D` between indices `left` and `right`?

Options :

6406534156684. ❌ It reverses the entire sub-list from left to right, regardless of whether the elements are odd or even.

6406534156685. ✓ It reverses only the odd elements in the range `[left, right]`, leaving even elements in their original positions.

6406534156686. ❌ It moves all even elements to the left and all odd elements to the right (a partition), but does not change the relative order of the odd elements themselves.

6406534156687. ❌ It sorts the sub-list from left to right in ascending order, ignoring whether elements are odd or even.

Question Number : 47 Question Id : 6406531230114 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

What will be the output of the following program when "test.txt" contains:

```
Hello world
Python is great
File handling is useful
```

```
with open("test.txt", "w") as file:
    file.write("New Line1\n")
    file.write("New Line2\n")

with open("test.txt", "r") as file:
    print(len(file.readlines()))
```

Options :

6406534156688. ✓ 2

6406534156689. ✘ 3

6406534156690. ✘ 5

6406534156691. ✘ It will give an error

Question Number : 48 Question Id : 6406531230115 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following Python code snippet.

```
class StudentRecords:  
    def __init__(self):  
        self.students = ["Ram", "Rajesh", "Suresh"]  
  
    def add_student(self, name):  
        self.students.append(name)  
  
    def update_student(self, index, name):  
        self.students[index] = name  
  
    def get_students(self):  
        return self.students  
  
records = StudentRecords()  
records.update_student(2, "Mukesh")  
records.add_student("Ramesh")  
  
for student in records.get_students():  
    print(student)
```

What will be the output of the above code?

Options :

Ram
Rajesh
Suresh
Mukesh

6406534156692. ✘ Suresh

Ram
Rajesh
Suresh
Mukesh

6406534156693. ✘ Ramesh

Ram
Rajesh
Mukesh
Ramesh

6406534156694. ✓

6406534156695. ✘

Ram
Rajesh
Ramesh

Question Number : 49 Question Id : 6406531230116 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

What is the output of the following Python code?

```
def pair_selector(numbers):
    min_val = float('inf')
    selected_pair = None

    for i in range(len(numbers)):
        for j in range(i + 1, len(numbers)):
            current_value = (numbers[i] + numbers[j]) - abs(numbers[i] - numbers[j])
            if current_value < min_val:
                min_val = current_value
                selected_pair = (numbers[i], numbers[j])

    return selected_pair[0] * selected_pair[1] if selected_pair else 0

data = [7, 3, 9, 5]
print(pair_selector(data))
```

Options :

6406534156696. ✘ 15

6406534156697. ✘ 18

6406534156698. ✓ 21

6406534156699. ✘ 24

Question Number : 50 Question Id : 6406531230117 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following Python code snippet:

```
X = {"apple", "banana"}  
Y = {"banana", "cherry"}  
Z = {"cherry", "apple"}  
  
while "cherry" in Z:  
    if "apple" in X:  
        X, Y, Z = X - Y, Y - Z, Z - X  
    if "banana" in Y:  
        X, Y, Z = Z | X, X | Y, Y | Z
```

At the end of execution, which of the following sets contains "apple"?

Options :

6406534156700. ✘ Only X

6406534156701. ✓ Only Y

6406534156702. ✘ Only Z

6406534156703. ✘ X and Z

Question Number : 51 Question Id : 6406531230118 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

A system categorizes students based on their marks as follows:

Marks Range	Category
($0 \leq$ Marks < 40)	Fail
($40 \leq$ Marks < 60)	Pass
($60 \leq$ Marks < 80)	Good
($80 \leq$ Marks ≤ 100)	Excellent

Which of the following snippets correctly computes and prints the category after accepting the marks as input? Assume that the input entered by the user will be an integer and will lie only in the range ([0, 100]).

Snippet-1

```
marks = int(input())
if marks < 40:
    category = 'Fail'
elif marks < 60:
    category = 'Pass'
elif marks < 80:
    category = 'Good'
else:
    category = 'Excellent'
print(category)
```

Snippet-2

```
marks = int(input())
if marks < 40:
    category = 'Fail'
if marks < 60:
    category = 'Pass'
if marks < 80:
    category = 'Good'
else:
    category = 'Excellent'
print(category)
```

Options :

6406534156704. ✓ Only Snippet-1 is correct

6406534156705. ✗ Only Snippet-2 is correct

6406534156706. ✗ Both Snippet-1 and Snippet-2 are correct

6406534156707. ✗ Both Snippet-1 and Snippet-2 are incorrect

Sub-Section Number :	3
Sub-Section Id :	640653189504
Question Shuffling Allowed :	Yes

Question Number : 52 Question Id : 6406531230119 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider the following python code:

```
def update_matrix(matrix):
    for i in range(len(matrix)):
        for j in range(len(matrix[i])):
            if i % 2 == 0:
                matrix[i][j] += 1
            else:
                matrix[i][j] *= 2
    return matrix

def compute_total(matrix):
    total = 0
    for row in matrix:
        total += sum(row)
    return total

mat = [[1, 2], [3, 4], [5, 6]]
new_mat = update_matrix(mat)
print(compute_total(new_mat))
```

What is the output of the program when executed?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

32

Question Number : 53 Question Id : 6406531230120 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider the following Python code snippet:

```
count = 0
for i in range(3):
    for j in range(i, 3):
        for k in range(j, 3):
            print("Hello")
```

How many times will the statement `print("Hello")` be executed?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 54 Question Id : 6406531230121 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider the following Python code snippet:

```
f = open('sample.txt', 'w')
f.write("alpha\n")
f.write("beta")
f.write(''\'\ngamma
delta''')
f.write("\nepsilon")
f.close()
```

How many lines will be present in the file `sample.txt` after executing the above code?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

5

Question Number : 55 Question Id : 6406531230122 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider the following snippet of code:

```
nums = [3, 6, 9, 12, 15]
result = []
i = 0
while i < len(nums):
    result += nums[i+1:] + nums[:i]
    i += 1
print(len(result))
```

What will be the value printed by this program?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

20

Sub-Section Number : 4

Sub-Section Id : 640653189505

Question Shuffling Allowed : Yes

Question Number : 56 **Question Id :** 6406531230123 **Question Type :** SA

Correct Marks : 4

Question Label : Short Answer Question

Consider the following Python code snippet.

```
def recursive_sum(lst):
    if not lst:
        return 0
    if len(lst) == 1:
        return lst[0]
    return lst[0] + recursive_sum(lst[1:-1]) + lst[-1]

print(recursive_sum([4, 5, 6, 7, 8, 9]))
```

What is the output of the program?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

39

Sub-Section Number : 5

Sub-Section Id : 640653189506

Question Shuffling Allowed : Yes

Question Number : 57 **Question Id :** 6406531230124 **Question Type :** MSQ

Correct Marks : 3 **Max. Selectable Options :** 0

Question Label : Multiple Select Question

Consider the following Python function:

```
def test_func(s, t):
    if len(s) != len(t):
        return False
    freq = {}
    for ch in s:
        freq[ch] = freq.get(ch, 0) + 1
    for ch in t:
        if ch not in freq or freq[ch] == 0:
            return False
        freq[ch] -= 1
    return True
```

Which of the following pairs of strings, when passed as arguments to `test_func(s, t)`, will return True?

Options :

- 6406534156713. ✓ "debitcard", "badcredit"
- 6406534156714. ✓ "admirer", "married"
- 6406534156715. ✗ "schoolmaster", "theclassname"
- 6406534156716. ✓ "aabbcc", "abcabc"

Question Number : 58 Question Id : 6406531230125 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the following code snippet.

```
temperature = int(input())
alert = False

if temperature > 35:
    alert = True
    if temperature > 45:
        status = 'Extreme Heat'
    else:
        status = 'High Temperature'
elif temperature > 20:
    if temperature > 25 and alert:
        status = 'Moderate'
    else:
        status = 'Pleasant'

print(status)
```

Which of the following statements is/are correct?

Options :

- 6406534156717. ✓ If the input `temperature` is 30 then, the output is `Pleasant`

- 6406534156718. ✗ If the input `temperature` is 45 then, the output is `Extreme Heat`

6406534156719. ✓ If the input `temperature` is 10 then, the code will give an error

6406534156720. ✗ If the input `temperature` is 26 then, the output is `Moderate`

Question Number : 59 Question Id : 6406531230126 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the below snippets, which are intended to create a dictionary with product names as keys and their frequency in the given list as values.

Snippet-1

```
products = ['laptop', 'tablet', 'phone', 'laptop', 'phone']
freq = {item: products.count(item) for item in products}
print(freq)
```

Snippet-2

```
products = ['laptop', 'tablet', 'phone', 'laptop', 'phone']
freq = {item: count(item) for item in products}
print(freq)
```

Select all the correct statement(s) from the given statements.

Options :

6406534156721. ✓ Snippet-1 is correct

6406534156722. ✗ Snippet-2 is correct

The correct snippet generates the output:

```
{['laptop': 2], ['tablet': 1], ['phone': 2]}
```

6406534156723. ✗

The correct snippet generates the output:

6406534156724. ✓

```
{'laptop': 2, 'tablet': 1, 'phone': 2}
```

Sub-Section Number :

6

Sub-Section Id :

640653189507

Question Shuffling Allowed :

No

Question Id : 6406531230127 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (60 to 61)

Question Label : Comprehension

Consider the following Employee class:

```
class Employee:  
    def __init__(self, name, salary):  
        self.name = name  
        self.salary = salary  
  
    def update_salary(self, new_salary):  
        self.salary = new_salary  
  
    def print_details(self):  
        print(f'Employee Name: {self.name}')  
        print(f'Salary: {self.salary}')
```

Now, the Manager class is a subclass of Employee:

```
class Manager(Employee):  
    total_managers = 0  
  
    def __init__(self, name, salary, department):  
        super().__init__(name, salary)  
        self.department = department  
        Manager.total_managers += 1  
  
    def is_IT_department(self):  
        return self.department == 'IT'  
  
    def print_details(self):  
        super().print_details()  
        print(f'Manager of Department: {self.department}')
```

Main Code Execution:

```
mgr = Manager('Alice', 75000, 'HR')  
mgr.update_salary(80000)  
mgr.print_details()
```

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 60 Question Id : 6406531230128 Question Type : MCQ

Correct Marks : 1.5

Question Label : Multiple Choice Question

What will be the output of the given code?

Options :

6406534156725. ✘ Employee Name: Alice Salary: 75000

6406534156726. ✓ Employee Name: Alice Salary: 80000 Manager of Department: HR

6406534156727. ✘ Employee Name: Alice Salary: 80000

6406534156728. ✘ Manager of Department: HR

Question Number : 61 Question Id : 6406531230129 Question Type : SA

Correct Marks : 1.5

Question Label : Short Answer Question

If the below main code is executed after the class definition, what will be the output?

```
managers = [
    Manager('Ramesh', 1000000, 'Marketing'),
    Manager('Rathika', 1200000, 'IT'),
    Manager('Anbu', 900000, 'HR')
]
print(managers[0].total_managers)
```

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

3

Sub-Section Number : 7

Sub-Section Id : 640653189508

Question Shuffling Allowed : No

Question Id : 6406531230130 **Question Type :** COMPREHENSION **Sub Question Shuffling Allowed :** No **Group Comprehension Questions :** No **Question Pattern Type :** NonMatrix

Question Numbers : (62 to 64)

Question Label : Comprehension

Consider the following snippet of code and answer the given sub-questions:

```
def track_assignments(total_assignments, completed_assignments):
    remaining_assignments = total_assignments - len(set(completed_assignments))

    if remaining_assignments == 0:
        print("All assignments are completed.")
        return True
    else:
        print(f"Assignments remaining: {remaining_assignments}")
        return False
```

Sub questions

Question Number : 62 **Question Id :** 6406531230131 **Question Type :** MCQ

Correct Marks : 1.5

Question Label : Multiple Choice Question

What will be the first line of output for

`track_assignments(10, [1, 2, 3, 4, 5])?`

Options :

6406534156730. ✘ All assignments are completed.

6406534156731. ✘ Assignments remaining: 3

6406534156732. ✓ Assignments remaining: 5

6406534156733. ✘ Assignments remaining: 6

Question Number : 63 Question Id : 6406531230132 Question Type : MSQ

Correct Marks : 1.5 Max. Selectable Options : 0

Question Label : Multiple Select Question

For which set of arguments will

`track_assignments()` return True?

Options :

6406534156734. ✓ 6, [1, 2, 3, 4, 5, 6]

6406534156735. ✓ 10, [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]

6406534156736. ✘ 8, [1, 2, 3, 4, 5, 6, 7]

6406534156737. ✘ 5, [1, 2, 3, 4]

Question Number : 64 Question Id : 6406531230133 Question Type : MSQ

Correct Marks : 1 Max. Selectable Options : 0

Question Label : Multiple Select Question

For which set of arguments will

`track_assignments()` return False?

Options :

6406534156738. ✓ 8, [1, 2, 3, 4, 5]

6406534156739. ✓ 10, [1, 2, 3, 4, 5, 6, 7, 8, 9]

6406534156740. ✘ 6, [1, 2, 3, 4, 5, 6]

6406534156741. ✓ 4, [1, 2, 3]

Sem2 Maths2

Section Id :	64065386893
Section Number :	4
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	50
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653189509
Question Shuffling Allowed :	No

Question Number : 65 Question Id : 6406531230134 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : SEMESTER II: MATHEMATICS FOR DATA SCIENCE II (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 :

6406534156742. ✓ YES

6406534156743. ✗ NO

Sub-Section Number :	2
Sub-Section Id :	640653189510
Question Shuffling Allowed :	Yes

Question Number : 66 Question Id : 6406531230135 Question Type : MCQ

Correct Marks : 1**Question Label :** Multiple Choice Question

Find the set of all possible values for $\alpha \in \mathbb{R}$ so that the set $\{(0, -\alpha^2, 2), (2, 0, \alpha), (2, \alpha, 0)\}$ is linearly dependent.

Options :

6406534156744. ✘ {0}

6406534156745. ✘ $\{\alpha \in \mathbb{R} \mid \alpha^2 = 2\}$ 6406534156746. ✓ $\{\alpha \in \mathbb{R} \mid \alpha^2 = 2 \text{ or } \alpha = 0\}$ 6406534156747. ✘ $\{\alpha \in \mathbb{R} \mid \alpha^2 < 2\}$ **Sub-Section Number :**

3

Sub-Section Id :

640653189511

Question Shuffling Allowed :

Yes

Question Number : 67 Question Id : 6406531230136 Question Type : MCQ**Correct Marks : 2****Question Label :** Multiple Choice Question

Consider the function $f : \mathbb{R}^2 \rightarrow \mathbb{R}$ defined by the formula

$$f(x, y) = \begin{cases} x & \text{if } y = x, \\ 0 & \text{otherwise.} \end{cases}$$

Choose the correct statement from the following.

Options :6406534156748. ✘ f is continuous and differentiable at $(0, 0)$.6406534156749. ✘ f is differentiable but not continuous at $(0, 0)$.6406534156750. ✓ f is continuous but not differentiable at $(0, 0)$.6406534156751. ✘ f is neither differentiable nor continuous at $(0, 0)$.**Sub-Section Number :**

4

Sub-Section Id :

640653189512

Question Shuffling Allowed :

Yes

Question Number : 68 Question Id : 6406531230137 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

For which of the following functions defined on $\mathbb{R}^2 \setminus \{(0, 0)\}$ does the limit of the function exist at $(0, 0)$?

Options :

6406534156752. ✓ $f_1(x, y) = 1 - e^{-\frac{1}{(x^2+y^2)}}$

6406534156753. ✗ $f_2(x, y) = 1 - e^{\frac{1}{(x^2+y^2)}}$

6406534156754. ✗ $f_3(x, y) = \frac{1}{1-e^{(x^2+y^2)}}$

6406534156755. ✓ $f_4(x, y) = \frac{1}{1+e^{(x^2+y^2)}}$

Sub-Section Number :

5

Sub-Section Id :

640653189513

Question Shuffling Allowed :

Yes

Question Number : 69 Question Id : 6406531230138 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following options is/are true?

Options :

6406534156756. ✓ If a system of linear equations $Ax = b$ has a solution, then b is a linear combination of the columns of the coefficient matrix A .

6406534156757. ✗ Consider a system of linear equations $Ax = b$. If b is a linear combination of the columns of the coefficient matrix A , then the system $Ax = b$ has a unique solution.

6406534156758. ✗ If the number of variables is more than the number of equations in a system of linear equations $Ax = 0$, then it has a unique solution.

6406534156759. ✓ If the columns of a matrix A are linearly independent, then the system $Ax = 0$ will have a unique solution.

Question Number : 70 Question Id : 6406531230139 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider \mathbb{R}^2 with the standard inner product and let W be a subspace of \mathbb{R}^2 . If P is the projection of \mathbb{R}^2 on W , choose the correct option(s).

Options :

6406534156760. ✓ If $Pv = v$ for some $v \in \mathbb{R}^2$, then $v \in W$.

6406534156761. ✗ $I - P$ need not be a projection.

If A is the matrix representation of P with respect to the same basis for the domain 6406534156762. ✓ and the co-domain, then $A^2 = A$.

6406534156763. ✓ Suppose $v \in W \cap W^\perp$, then $v = 0$

Question Number : 71 Question Id : 6406531230140 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Suppose f is a scalar-valued function defined on $\mathbb{R}^2 \setminus \{(0, 0)\}$. Choose all the statements that guarantee that $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ exists?

Options :

6406534156764. ✗ $\lim_{x \rightarrow 0} f(x, 0) = \lim_{y \rightarrow 0} f(0, y)$.

For any sequence (x_n, y_n) in \mathbb{R}^2 such that $x_n \rightarrow 0$ and $y_n \rightarrow 0$, $f(x_n, y_n)$ is a convergent sequence with the limit independent of the chosen sequence.

6406534156766. ✗ For any $m \in \mathbb{R}$, we have $\lim_{x \rightarrow 0} f(x, mx)$ exists and is independent of m .

There exist functions g and h defined on \mathbb{R}^2 such that

$g(x, y) \leq f(x, y) \leq h(x, y)$ for all $(x, y) \in \mathbb{R}^2 \setminus \{(0, 0)\}$, and

$$\lim_{(x,y) \rightarrow (0,0)} g(x, y) = \lim_{(x,y) \rightarrow (0,0)} h(x, y)$$

6406534156767. ✓

Sub-Section Number :

6

Sub-Section Id :

640653189514

Question Shuffling Allowed :

Yes

Question Number : 72 Question Id : 6406531230141 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Let $A = \begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{bmatrix}$ and $\det(A) = -3$. Let $B = \begin{bmatrix} 2a_1 & b_1 & c_1 \\ -6a_2 & -3b_2 & -3c_2 \\ 2a_3 & b_3 & c_3 \end{bmatrix}$. Find $\det(B)$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

18

Question Number : 73 **Question Id :** 6406531230142 **Question Type :** SA

Correct Marks : 1

Question Label : Short Answer Question

Let $A = \begin{bmatrix} 2 & 2 \\ 3 & 7 \end{bmatrix}$. Find the determinant of the matrix $A^8 - A^7$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0

Question Number : 74 **Question Id :** 6406531230143 **Question Type :** SA

Correct Marks : 1

Question Label : Short Answer Question

Let $A, B \in M_{4 \times 4}(\mathbb{R})$ such that $A^2 = 2I$ and $B^2 = 3I$. If $\det(A) > 0$ and $\det(B) < 0$, find $\det(AB)$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

-36

Sub-Section Number : 7

Sub-Section Id : 640653189515

Question Shuffling Allowed : Yes

Question Number : 75 **Question Id :** 6406531230144 **Question Type :** SA

Correct Marks : 2

Question Label : Short Answer Question

If (a, b) is the projection of the vector $(0, 5)$ on the line $y = 3x$ using the standard inner product on \mathbb{R}^2 , find $a + b$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

6

Sub-Section Number : 8

Sub-Section Id : 640653189516

Question Shuffling Allowed : No

Question Id : 6406531230145 **Question Type :** COMPREHENSION **Sub Question Shuffling Allowed :** No **Group Comprehension Questions :** No **Question Pattern Type :** NonMatrix

Question Numbers : (76 to 77)

Question Label : Comprehension

Let $v_1 = (1, 4, 10)$, $v_2 = (0, 1, 3)$ and $v_3 = (-1, 2, 3k + 2)$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 76 **Question Id :** 6406531230146 **Question Type :** SA

Correct Marks : 1

Question Label : Short Answer Question

Find the value of $k \in \mathbb{R}$ such that

$v_3 \in \text{span}\{v_1, v_2\}$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

2

Question Number : 77 **Question Id :** 6406531230147 **Question Type :** SA

Correct Marks : 1

Question Label : Short Answer Question

Let the value of k be the one obtained in the previous question . If $v_3 = \alpha v_1 + \beta v_2$, find $\alpha + \beta$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

5

Question Id : 6406531230148 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (78 to 79)

Question Label : Comprehension

Let $T: \mathbb{R}^2 \rightarrow \mathbb{R}^2$ be a linear transformation such that $T(1, 1) = (2, 3)$ and $T(1, 0) = (1, -1)$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 78 Question Id : 6406531230149 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Find the expression for $T(x, y)$.

Options :

6406534156774. ✘ $T(x, y) = (x + y, x + 4y)$

6406534156775. ✘ $T(x, y) = (x - y, -x + 4y)$

6406534156776. ✘ $T(x, y) = (x + y, x - 4y)$

6406534156777. ✓ $T(x, y) = (x + y, -x + 4y)$

Question Number : 79 Question Id : 6406531230150 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Suppose A is the matrix representation of T with respect to the standard basis for both domain and co-domain. Then A is given by

Options :

6406534156778. ✘ $\begin{bmatrix} 1 & -1 \\ 1 & 4 \end{bmatrix}$

6406534156779. ✓ $\begin{bmatrix} 1 & 1 \\ -1 & 4 \end{bmatrix}$

6406534156780. ✘ $\begin{bmatrix} 1 & 1 \\ 1 & 4 \end{bmatrix}$

6406534156781. ✘ $\begin{bmatrix} 1 & -1 \\ -1 & 4 \end{bmatrix}$

Sub-Section Number :

9

Sub-Section Id :

640653189517

Question Shuffling Allowed :

No

Question Id : 6406531230151 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (80 to 82)

Question Label : Comprehension

Let $T: \mathbb{R}^4 \rightarrow \mathbb{R}^3$ be a linear transformation and A be a matrix such that

$T(x) = Ax$ for all $x \in \mathbb{R}^4$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 80 Question Id : 6406531230152 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

What is the maximum rank of A ?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

3

Question Number : 81 Question Id : 6406531230153 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

What is the minimum value for nullity of A ?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 82 Question Id : 6406531230154 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Choose the correct option for T .

Options :

6406534156784. ✘ T may be one-one but not onto.

6406534156785. ✓ T may be onto but not one-one.

6406534156786. ✘ T must be both one-one and onto.

6406534156787. ✘ T can neither be one-one nor onto.

Question Id : 6406531230155 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (83 to 85)

Question Label : Comprehension

Consider the function f defined by $f(x, y) = \frac{1}{1-e^{(x^2+y^2)}}$ on an appropriate domain of \mathbb{R}^2 .

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 83 Question Id : 6406531230156 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

What is the minimum number of points required to be removed from \mathbb{R}^2 to obtain a valid domain for f ?

Options :

6406534156788. ✘ 0

6406534156789. ✓ 1

6406534156790. ✘ Infinitely many

Question Number : 84 Question Id : 6406531230157 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

What is the range of the function

f when defined on the domain

$$D = \{(x, y) \in \mathbb{R}^2 \mid x > 0 \text{ and } y > 0\}?$$

Options :

6406534156791. ✓ $(-\infty, 0)$

6406534156792. ✗ $(0, \infty)$

6406534156793. ✗ $(-1, 0)$

6406534156794. ✗ $(0, 1)$

Question Number : 85 Question Id : 6406531230158 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

The function f defined on the domain
specified in the previous subquestion
is injective.

Options :

6406534156795. ✗ TRUE

6406534156796. ✓ FALSE

Question Id : 6406531230159 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (86 to 88)

Question Label : Comprehension

Consider the function $f(x, y) = \ln(x + y + xy)$ defined on $D = \{(x, y) \in \mathbb{R}^2 \mid (x+1)(y+1) > 1\}$. Let (a, b) denote the unit direction along which the ascent
of the function f is fastest at the point $(0, 1)$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 86 Question Id : 6406531230160 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Find the value of $\sqrt{5}a$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

2

Question Number : 87 Question Id : 6406531230161 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Find the value of $\sqrt{5}b$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 88 Question Id : 6406531230162 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

If (c, d) denotes a direction vector along which there is no change in f at $(0, 1)$. Find the value of $\frac{c}{d}$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

-0.5

Question Id : 6406531230163 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (89 to 90)

Question Label : Comprehension

Consider the function $f(x, y) = x \ln(y) + x^2$ defined on $\mathbb{R} \times (0, \infty)$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 89 Question Id : 6406531230164 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

If the directional derivative of f at the point $(x, 1)$ in the direction $\left(\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}\right)$ is equal to $3\sqrt{2}$, then find the value of x .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

6

Question Number : 90 Question Id : 6406531230165 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Suppose $(a, 1, b)$ is a point on the tangent line at $(x, 1)$ (where x is obtained from the previous subquestion) in the direction $\left(\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}\right)$. Find the value of $a^2 - b$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0

Sub-Section Number : 10

Sub-Section Id : 640653189518

Question Shuffling Allowed : No

Question Id : 6406531230166 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (91 to 93)**Question Label :** Comprehension

Consider the function f defined on \mathbb{R}^2 by $f(x, y) = x^2y^2 + xy$.

Based on the above data, answer the given subquestions.

Sub questions**Question Number : 91 Question Id : 6406531230167 Question Type : MSQ****Correct Marks : 2 Max. Selectable Options : 0****Question Label :** Multiple Select Question

Which of the following are critical points of f ?

Options :6406534156802. ✓ $(1, -\frac{1}{2})$ 6406534156803. ✗ $(2, -1)$ 6406534156804. ✗ $(-1, 2)$ 6406534156805. ✓ $(\frac{1}{2}, -1)$ **Question Number : 92 Question Id : 6406531230168 Question Type : SA****Correct Marks : 1****Question Label :** Short Answer Question

It can be checked that $(0, 0)$ is a critical point of f . Find the determinant of the Hessian matrix of f at $(0, 0)$.

Response Type : Numeric**Evaluation Required For SA :** Yes**Show Word Count :** Yes**Answers Type :** Equal**Text Areas :** PlainText**Possible Answers :**

-1

Question Number : 93 Question Id : 6406531230169 Question Type : MCQ**Correct Marks : 1****Question Label :** Multiple Choice Question

What can be concluded about the critical point $(0, 0)$ from the Hessian test?

Options :

6406534156807. ✘ The Hessian test is inconclusive.

6406534156808. ✘ $(0, 0)$ is a local minimum.

6406534156809. ✘ $(0, 0)$ is a local maximum.

6406534156810. ✓ $(0, 0)$ is a saddle point.

Sub-Section Number : 11

Sub-Section Id : 640653189519

Question Shuffling Allowed : No

Question Id : 6406531230170 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (94 to 97)

Question Label : Comprehension

Consider the graph of a scalar-valued function $f(x, y)$ defined on a closed and bounded domain D in \mathbb{R}^2 . The points on the graph that are closest to and farthest from a fixed point (x_0, y_0, z_0) can be found by computing the critical points of the function defined by computing the square of the distance between (x_0, y_0, z_0) and a generic point $(x, y, f(x, y))$ on the graph.

Note that the domain of the distance function is also D .

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 94 Question Id : 6406531230171 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Consider the function $f(x, y) = x^2 + y^2$

restricted to the domain $D = \{(x, y) \in$

$\mathbb{R}^2 \mid x^2 + y^2 \leq 1\}$. Using the procedure

described in the main question, choose the expression for the function ϕ that measures the square of the distance between $(0, 0, -1)$ and a generic point on the graph of f .

Options :

6406534156811. ✘ $\phi(x, y) = x^2 - y^2 - (x^2 + y^2 + 1)^2$

6406534156812. ✘ $\phi(x, y) = x^2 + y^2 + (x^2 - y^2 - 1)^2$

6406534156813. ✘ $\phi(x, y) = x^2 + y^2 + (x^2 + y^2 - 1)^2$

6406534156814. ✓ $\phi(x, y) = x^2 + y^2 + (x^2 + y^2 + 1)^2$

Question Number : 95 Question Id : 6406531230172 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Which of the following is a critical point of the function ϕ obtained in the previous subquestion.

Options :

6406534156815. ✗ $(\frac{1}{2}, \frac{1}{2})$

6406534156816. ✓ $(0, 0)$

6406534156817. ✗ $(-\frac{1}{2}, \frac{1}{2})$

6406534156818. ✗ ϕ does not have any critical points.

Question Number : 96 Question Id : 6406531230173 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Choose the correct statements from the following.

Options :

6406534156819. ✓ $(0, 0)$ is a global minimum for ϕ .

6406534156820. ✓ $(\frac{1}{2}, \frac{\sqrt{3}}{2})$ is a global maximum for ϕ .

6406534156821. ✗ $(\frac{1}{2}, \frac{1}{2})$ is a global maximum for ϕ .

6406534156822. ✗ There are infinitely many global minima.

6406534156823. ✓ There are infinitely many global maxima.

Question Number : 97 Question Id : 6406531230174 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Using the function ϕ , compute the distance between $(0, 0, -1)$ and a point on the graph of $f(x, y) = x^2 + y^2$ that is closest to $(0, 0, -1)$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Sub-Section Number : 12

Sub-Section Id : 640653189520

Question Shuffling Allowed : No

Question Id : 6406531230175 **Question Type :** COMPREHENSION **Sub Question Shuffling Allowed :** No **Group Comprehension Questions :** No **Question Pattern Type :** NonMatrix

Question Numbers : (98 to 101)

Question Label : Comprehension

Let $u_1 = (1, 0, 1)$, $u_2 = (1, -1, 1)$, $u_3 = (-1, 2, -1)$ and $W = \text{span}\{u_1, u_2, u_3\}$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 98 **Question Id :** 6406531230176 **Question Type :** SA

Correct Marks : 1

Question Label : Short Answer Question

Find the dimension of W .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

2

Question Number : 99 **Question Id :** 6406531230177 **Question Type :** MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Let $U = \{(x, y, z) \mid x + y + z = 0\}$.

Which of the following sets represents

$W \cap U$?

Options :

6406534156826. ✘ $\text{span}\{(-1, 0, 1)\}$

6406534156827. ✘ $\text{span}\{(1, 2, 1)\}$

6406534156828. ✓ $\{(x, y, z) \mid 2x = -y = 2z\}$

6406534156829. ✘ $\{(x, y, z) \mid x = -2y = z\}$

Question Number : 100 Question Id : 6406531230178 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Let A be a 3×3 matrix such that u_1 and u_2 are the first 2 columns of A .

Choose the correct option from the following.

Options :

If u_3 is the third column of A ,

6406534156830. ✘ then $Ax = 0$ has a unique solution.

If $u_1 + u_2$ is the third column of A , then

6406534156831. ✓ $Ax = 0$ has infinitely many solutions.

The system $Ax = 0$ will not have any solution if the third column of A is u_1

6406534156832. ✘ or u_2 .

If u_3 is the third column of A , then

$Ax = b$ will not have a solution for any

6406534156833. ✘ $b \in \mathbb{R}^3$.

Question Number : 101 Question Id : 6406531230179 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following vector spaces is/are isomorphic to W ?

Options :6406534156834. ✓ $W_1 = \mathbb{R}^2$

$W_2 = \{x \in \mathbb{R}^3 \mid Ax = 0 \text{ where the}$
 6406534156835. ✗ columns of A are u_1, u_2 and $u_3\}$

6406534156836. ✗ $W_3 = \{(x, y, z) \mid x + y = z, y - z = x\}$

6406534156837. ✓ $W_4 = \left\{ \begin{bmatrix} a & b \\ c & d \end{bmatrix} \mid a + b = 0, c + d = 0 \right\}$

Sem2 Statistics2

Section Id :	64065386894
Section Number :	5
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	12
Number of Questions to be attempted :	12
Section Marks :	40
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653189521
Question Shuffling Allowed :	No

Question Number : 102 Question Id : 6406531230180 Question Type : MCQ**Correct Marks : 0**

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : SEMESTER II: STATISTICS FOR DATA SCIENCE II (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 :

6406534156838. ✓ YES

6406534156839. ✗ NO

Question Number : 103 Question Id : 6406531230181 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

Discrete random variables:

Distribution	PMF ($f_X(k)$)	CDF ($F_X(x)$)	$E[X]$	$\text{Var}(X)$
Uniform(A) $A = \{a, a+1, \dots, b\}$	$\frac{1}{n}, \quad x = k$ $n = b - a + 1$ $k = a, a+1, \dots, b$	$\begin{cases} 0 & x < 0 \\ \frac{k-a+1}{n} & k \leq x < k+1 \\ & k = a, a+1, \dots, b-1, b \\ 1 & x \geq n \end{cases}$	$\frac{a+b}{2}$	$\frac{n^2-1}{12}$
Bernoulli(p)	$\begin{cases} p & x = 1 \\ 1-p & x = 0 \end{cases}$	$\begin{cases} 0 & x < 0 \\ 1-p & 0 \leq x < 1 \\ 1 & x \geq 1 \end{cases}$	p	$p(1-p)$
Binomial(n, p)	${}^n C_k p^k (1-p)^{n-k}, \quad k = 0, 1, \dots, n$	$\begin{cases} 0 & x < 0 \\ \sum_{i=0}^k {}^n C_i p^i (1-p)^{n-i} & k \leq x < k+1 \\ & k = 0, 1, \dots, n \\ 1 & x \geq n \end{cases}$	np	$np(1-p)$
Geometric(p)	$(1-p)^{k-1} p, \quad k = 1, \dots, \infty$	$\begin{cases} 0 & x < 0 \\ 1 - (1-p)^k & k \leq x < k+1 \\ & k = 1, \dots, \infty \end{cases}$	$\frac{1}{p}$	$\frac{1-p}{p^2}$
Poisson(λ)	$\frac{e^{-\lambda} \lambda^k}{k!}, \quad k = 0, 1, \dots, \infty$	$\begin{cases} 0 & x < 0 \\ e^{-\lambda} \sum_{i=0}^k \frac{\lambda^i}{i!} & k \leq x < k+1 \\ & k = 0, 1, \dots, \infty \end{cases}$	λ	λ

Continuous random variables:

Distribution	PDF ($f_X(x)$)	CDF ($F_X(x)$)	$E[X]$	$\text{Var}(X)$
Uniform[a, b]	$\frac{1}{b-a}, \quad a \leq x \leq b$	$\begin{cases} 0 & x \leq a \\ \frac{x-a}{b-a} & a < x < b \\ 1 & x \geq b \end{cases}$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$
Exp(λ)	$\lambda e^{-\lambda x}, \quad x > 0$	$\begin{cases} 0 & x \leq 0 \\ 1 - e^{-\lambda x} & x > 0 \end{cases}$	$\frac{1}{\lambda}$	$\frac{1}{\lambda^2}$
Normal(μ, σ^2)	$\frac{1}{\sigma \sqrt{2\pi}} \exp\left(\frac{-(x-\mu)^2}{2\sigma^2}\right), \quad -\infty < x < \infty$	No closed form	μ	σ^2
Gamma(α, β)	$\frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}, \quad x > 0$		$\frac{\alpha}{\beta}$	$\frac{\alpha}{\beta^2}$
Beta(α, β)	$\frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1} (1-x)^{\beta-1} \quad 0 < x < 1$		$\frac{\alpha}{\alpha+\beta}$	$\frac{\alpha\beta}{(\alpha+\beta)^2(\alpha+\beta+1)}$

1. **Markov's inequality:** Let X be a discrete random variable taking non-negative values with a finite mean μ . Then,

$$P(X \geq c) \leq \frac{\mu}{c}$$

2. **Chebyshev's inequality:** Let X be a discrete random variable with a finite mean μ and a finite variance σ^2 . Then,

$$P(|X - \mu| \geq k\sigma) \leq \frac{1}{k^2}$$

3. **Weak Law of Large numbers:** Let $X_1, X_2, \dots, X_n \sim \text{iid } X$ with $E[X] = \mu, \text{Var}(X) = \sigma^2$.

Define sample mean $\bar{X} = \frac{X_1 + X_2 + \dots + X_n}{n}$. Then,

$$P(|\bar{X} - \mu| > \delta) \leq \frac{\sigma^2}{n\delta^2}$$

4. **Using CLT to approximate probability:** Let $X_1, X_2, \dots, X_n \sim \text{iid } X$ with $E[X] = \mu, \text{Var}(X) = \sigma^2$.

Define $Y = X_1 + X_2 + \dots + X_n$. Then,

$$\frac{Y - n\mu}{\sqrt{n}\sigma} \approx \text{Normal}(0, 1).$$

5. **Bias of an estimator:** $\text{Bias}(\hat{\theta}, \theta) = E[\hat{\theta}] - \theta$.

6. **Method of moments:** Sample moments, $M_k(X_1, X_2, \dots, X_n) = \frac{1}{n} \sum_{i=1}^n X_i^k$

Procedure: For one parameter θ

- Sample moment: m_1
- Distribution moment: $E(X) = f(\theta)$
- Solve for θ from $f(\theta) = m_1$ in terms of m_1 .
- $\hat{\theta}$: replace m_1 by M_1 in the above solution.

7. **Likelihood of i.i.d. samples:** Likelihood of a sampling x_1, x_2, \dots, x_n , denoted

$$L(x_1, \dots, x_n) = \prod_{i=1}^n f_X(x_i; \theta_1, \theta_2, \dots)$$

8. **Maximum likelihood (ML) estimation:**

$$\theta_1^*, \theta_2^*, \dots = \arg \max_{\theta_1^*, \theta_2^*, \dots} \prod_{i=1}^n f_X(x_i; \theta_1, \theta_2, \dots)$$

9. **Bayesian estimation:** Let $X_1, \dots, X_n \sim$ i.i.d. X , parameter Θ .

Prior distribution of $\Theta : \Theta \sim f_\Theta(\theta)$.

Samples, $S : (X_1 = x_1, \dots, X_n = x_n)$

Posterior: $\Theta | (X_1 = x_1, \dots, X_n = x_n)$

Bayes' rule: Posterior \propto Prior \times Likelihood

Posterior density $\propto f_\Theta(\theta) \times P(X_1 = x_1, \dots, X_n = x_n | \Theta = \theta)$

10. **Normal samples with unknown mean and known variance:**

$X_1, \dots, X_n \sim$ i.i.d. Normal(M, σ^2).

Prior $M \sim$ Normal(μ_0, σ_0^2).

$$\text{Posterior mean: } \hat{\mu} = \bar{X} \left(\frac{n\sigma_0^2}{n\sigma_0^2 + \sigma^2} \right) + \mu_0 \left(\frac{\sigma^2}{n\sigma_0^2 + \sigma^2} \right)$$

11. Hypothesis Testing

- Test for mean

Case (1): When population variance σ^2 is known (z -test)

Test	H_0	H_A	Test statistic	Rejection region
right-tailed	$\mu = \mu_0$	$\mu > \mu_0$	$T = \bar{X}$ $Z = \frac{\bar{X} - \mu_0}{\sigma/\sqrt{n}}$	$\bar{X} > c$
left-tailed	$\mu = \mu_0$	$\mu < \mu_0$	$T = \bar{X}$ $Z = \frac{\bar{X} - \mu_0}{\sigma/\sqrt{n}}$	$\bar{X} < c$
two-tailed	$\mu = \mu_0$	$\mu \neq \mu_0$	$T = \bar{X}$ $Z = \frac{\bar{X} - \mu_0}{\sigma/\sqrt{n}}$	$ \bar{X} - \mu_0 > c$

Case (2): When population variance σ^2 is unknown (t -test)

Test	H_0	H_A	Test statistic	Rejection region
right-tailed	$\mu = \mu_0$	$\mu > \mu_0$	$T = \bar{X}$ $t_{n-1} = \frac{\bar{X} - \mu_0}{S/\sqrt{n}}$	$\bar{X} > c$
left-tailed	$\mu = \mu_0$	$\mu < \mu_0$	$T = \bar{X}$ $t_{n-1} = \frac{\bar{X} - \mu_0}{S/\sqrt{n}}$	$\bar{X} < c$
two-tailed	$\mu = \mu_0$	$\mu \neq \mu_0$	$T = \bar{X}$ $t_{n-1} = \frac{\bar{X} - \mu_0}{S/\sqrt{n}}$	$ \bar{X} - \mu_0 > c$

- χ^2 -test for variance:

Test	H_0	H_A	Test statistic	Rejection region
right-tailed	$\sigma = \sigma_0$	$\sigma > \sigma_0$	$T = \frac{(n-1)S^2}{\sigma_0^2} \sim \chi_{n-1}^2$	$S^2 > c^2$
left-tailed	$\sigma = \sigma_0$	$\sigma < \sigma_0$	$T = \frac{(n-1)S^2}{\sigma_0^2} \sim \chi_{n-1}^2$	$S^2 < c^2$
two-tailed	$\sigma = \sigma_0$	$\sigma \neq \sigma_0$	$T = \frac{(n-1)S^2}{\sigma_0^2} \sim \chi_{n-1}^2$	$S^2 > c^2$ where $\frac{\alpha}{2} = P(S^2 > c^2)$ or $S^2 < c^2$ where $\frac{\alpha}{2} = P(S^2 < c^2)$

- Two samples z -test for means:

Test	H_0	H_A	Test statistic	Rejection region
right-tailed	$\mu_1 = \mu_2$	$\mu_1 > \mu_2$	$T = \bar{X} - \bar{Y}$ $\bar{X} - \bar{Y} \sim \text{Normal}\left(0, \frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}\right)$ if H_0 is true	$\bar{X} - \bar{Y} > c$
left-tailed	$\mu_1 = \mu_2$	$\mu_1 < \mu_2$	$T = \bar{Y} - \bar{X}$ $\bar{Y} - \bar{X} \sim \text{Normal}\left(0, \frac{\sigma_2^2}{n_2} + \frac{\sigma_1^2}{n_1}\right)$ if H_0 is true	$\bar{Y} - \bar{X} > c$
two-tailed	$\mu_1 = \mu_2$	$\mu_1 \neq \mu_2$	$T = \bar{X} - \bar{Y}$ $\bar{X} - \bar{Y} \sim \text{Normal}\left(0, \frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}\right)$ if H_0 is true	$ \bar{X} - \bar{Y} > c$

- Two samples F -test for variances

Test	H_0	H_A	Test statistic	Rejection region
one-tailed	$\sigma_1 = \sigma_2$	$\sigma_1 > \sigma_2$	$T = \frac{S_1^2}{S_2^2} \sim F_{(n_1-1, n_2-1)}$	$\frac{S_1^2}{S_2^2} > 1 + c$
one-tailed	$\sigma_1 = \sigma_2$	$\sigma_1 < \sigma_2$	$T = \frac{S_1^2}{S_2^2} \sim F_{(n_1-1, n_2-1)}$	$\frac{S_1^2}{S_2^2} < 1 - c$
two-tailed	$\sigma_1 = \sigma_2$	$\sigma_1 \neq \sigma_2$	$T = \frac{S_1^2}{S_2^2} \sim F_{(n_1-1, n_2-1)}$	$\frac{S_1^2}{S_2^2} > 1 + c_R$ where $\frac{\alpha}{2} = P(T > 1 + c_R)$ or $\frac{S_1^2}{S_2^2} < 1 - c_L$ where $\frac{\alpha}{2} = P(T < 1 - c_L)$

Use the following information if required:

1. F_Z values.

$$F_Z(-1.33) = 0.09, F_Z(-0.13) = 0.45, F_Z(2) = 0.9772, F_Z(0.2) = 0.5793, F_Z(-1.645) = 0.05, F_Z(1.645) = 0.95, F_Z(1) = 0.84134, F_Z(-1) = 0.15866$$

2. $\int x^n dx = \frac{x^{n+1}}{n+1}$

Options :

6406534156840. ✓ Useful Data has been mentioned above.

6406534156841. ❌ This data attachment is just for a reference & not for an evaluation.

Sub-Section Number : 2**Sub-Section Id :** 640653189522**Question Shuffling Allowed :** Yes**Question Number : 104 Question Id : 6406531230182 Question Type : MCQ****Correct Marks : 3**

Question Label : Multiple Choice Question

If $X \sim \text{Exp}(\lambda)$, then find the PDF of $Y = \sqrt{X}$.**Options :**

$$f_Y(y) = \begin{cases} 2\lambda y e^{-\lambda y^2}, & y > 0, \\ 0, & \text{otherwise.} \end{cases}$$

6406534156842. ✓

$$f_Y(y) = \begin{cases} \lambda e^{-\lambda y}, & y > 0, \\ 0, & \text{otherwise.} \end{cases}$$

6406534156843. ❌

$$f_Y(y) = \begin{cases} \lambda e^{-\lambda y^2}, & y > 0, \\ 0, & \text{otherwise.} \end{cases}$$

6406534156844. ❌

$$f_Y(y) = \begin{cases} \lambda y e^{-\lambda y^2}, & y > 0, \\ 0, & \text{otherwise.} \end{cases}$$

6406534156845. ❌

Question Number : 105 Question Id : 6406531230183 Question Type : MCQ**Correct Marks : 3**

Question Label : Multiple Choice Question

Suppose $X \sim N(\mu, \sigma^2)$ with an unknown σ . For $n = 16$ i.i.d. samples of X , the observed sample mean is 10.2 and the sample standard deviation is 3. Let the null and alternative hypothesis be $H_0 : \mu = 9.5$ and $H_A : \mu > 9.5$. Suppose $T = \frac{X_1 + X_2 + \dots + X_{16}}{16}$. Consider a test that rejects H_0 if $T > c$ for some constant c . What is the level of significance in terms of ' c '?

Options :

$$1 - F_{t_{15}}\left(\frac{4(c - 9.5)}{3}\right)$$

6406534156846. ✓

6406534156847. ✶ $1 - F_{t_{16}}\left(\frac{4(c - 9.5)}{3}\right)$

6406534156848. ✶ $1 - F_Z\left(\frac{4(c - 9.5)}{3}\right)$

6406534156849. ✶ $F_Z\left(\frac{4(c - 9.5)}{3}\right)$

Sub-Section Number :

3

Sub-Section Id :

640653189523

Question Shuffling Allowed :

Yes

Question Number : 106 Question Id : 6406531230184 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Suppose $X_1, X_2, \dots, X_n \sim \text{i.i.d Uniform}(0, \theta)$ and let $\hat{\theta} = \frac{k}{n} \sum_{i=1}^n X_i$ be an estimator of θ . Which of the following option(s) is(are) correct?

Options :

6406534156850. ✶ $E[\hat{\theta}] = k \cdot \frac{n(n+1)}{2} E[X_1]$

6406534156851. ✓ $\hat{\theta}$ is an unbiased estimator of θ if and only if $k = 2$.

6406534156852. ✓ $\text{Var}(\hat{\theta}) = \frac{k^2}{n} \cdot \frac{\theta^2}{12}$

6406534156853. ✶ $E[\hat{\theta}] = \theta$ for all values of k

6406534156854. ✓ Risk = $\frac{\theta^2}{3n}$, for $k = 2$

Sub-Section Number :

4

Sub-Section Id :

640653189524

Question Shuffling Allowed :

Yes

Question Number : 107 Question Id : 6406531230185 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

A hospital claims that the average waiting time in the emergency room is 20 minutes with a standard deviation of 6 minutes. A sample of 36 patients has a mean waiting time of 22 minutes. Let the null and alternative hypotheses be $H_0 : \mu = 20$ and $H_A : \mu > 20$. Consider a test that rejects H_0 if $\bar{X} > c$ for some constant c . What is the value of ' c ' at 5% level of significance? Enter the answer correct to two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

21.62 to 21.68

Sub-Section Number : 5

Sub-Section Id : 640653189525

Question Shuffling Allowed : No

Question Id : 6406531230186 **Question Type :** COMPREHENSION **Sub Question Shuffling**

Allowed : No **Group Comprehension Questions :** No **Question Pattern Type :** NonMatrix

Question Numbers : (108 to 109)

Question Label : Comprehension

A software company is analyzing the bug reports for their newly developed application. Some bug reports identify a critical bug in the application. To estimate the probability p of a bug report identifying a critical bug, they collect a random sample of 200 bug reports, and find that 50 are classified as critical. The company adopts a Bayesian approach with a Beta distribution as the prior for p .

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 108 **Question Id :** 6406531230187 **Question Type :** MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

The company assumes a Beta(1.4, b) prior for p . Given that prior knowledge suggests the expected value of p is approximately 0.2, determine the appropriate value of b .

Options :

6406534156856. ✘ $b = 1.4$

6406534156857. ✘ $b = 7.0$

6406534156858. ✓ $b = 5.6$

6406534156859. ✘ $b = 3.5$

Question Number : 109 Question Id : 6406531230188 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Using the prior distribution and the observed data, compute the posterior distribution of p .

Options :

6406534156860. ✘ Beta(50.4, 154.6)

6406534156861. ✘ Beta(1.4, 5.6)

6406534156862. ✘ Beta(5.6, 1.4)

6406534156863. ✓ Beta(51.4, 155.6)

Sub-Section Number : 6

Sub-Section Id : 640653189526

Question Shuffling Allowed : No

Question Id : 6406531230189 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (110 to 111)

Question Label : Comprehension

A service center monitors the waiting time X (in minutes) for customers, and X follows a continuous probability distribution with the probability density function (PDF):

$$f_X(x) = \frac{3}{\theta^3}x^2, 0 < x < \theta$$

where $\theta > 1$ is an unknown parameter representing the maximum possible waiting time for any customer. For a random sample of five customers, the waiting times (in minutes) are 2, 4, 1, 3, 5.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 110 Question Id : 6406531230190 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

Find the method of moments estimate of θ for the given sample.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

4

Question Number : 111 Question Id : 6406531230191 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

The company has a policy requirement that the average waiting time must not exceed 3 minutes.

Based on the estimated value of θ , determine whether the company meets this requirement.

Options :

6406534156865. ✓ The company meets the requirement.

6406534156866. ✗ The company does not meet the requirement.

Question Id : 6406531230192 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (112 to 113)

Question Label : Comprehension

A research team is analyzing customer complaints per day for a new service. The number of complaints X follows a Poisson distribution with an unknown average rate λ . The number of complaints observed over a period of 10 days are as follows :

3, 5, 2, 4, 6, 3, 4, 7, 5, 4

The team aims to estimate λ using two different methods: Maximum Likelihood Estimation (MLE) and Bayesian Estimation.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 112 Question Id : 6406531230193 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Find the maximum likelihood estimate of λ for the given sample. Enter the answer correct to one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

4.1 to 4.5

Question Number : 113 Question Id : 6406531230194 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Assume the prior distribution of λ to be Gamma(3, 2). Determine the posterior distribution of λ .

Options :

6406534156868. ✘ Gamma(45, 12)

6406534156869. ✘ Gamma(12, 46)

6406534156870. ✓ Gamma(46, 12)

6406534156871. ✘ Gamma(12, 45)

Question Id : 6406531230195 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (114 to 115)

Question Label : Comprehension

A researcher claims that the average daily screen time for adults is 6 hours with a standard deviation of 1.5 hours. Let the null and alternative hypothesis be $H_0 : \mu = 6$ and $H_A : \mu < 6$. A random sample of 100 adults is observed and critical region is defined to be $\bar{X} < 5.8$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 114 Question Id : 6406531230196 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Find the P -value. Enter the answer correct to two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.06 to 0.12

Question Number : 115 Question Id : 6406531230197 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Find the power of the test against the alternative $\mu = 5.5$. Enter the answer correct to two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.95 to 1

Question Id : 6406531230198 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (116 to 117)

Question Label : Comprehension

A discrete random variable X has the following probability mass function :

X	2	5	x_3
$P(X = x)$	2θ	2θ	θ

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 116 Question Id : 6406531230199 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

If $E(X) = 4$, then what will be the value of x_3 ?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

6

Question Number : 117 Question Id : 6406531230200 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Find the value of $\text{Var}(X)$.

Options :

6406534156875. ✘ 16

6406534156876. ✘ 18.8

6406534156877. ✖ 6

6406534156878. ✓ 2.8

Question Id : 6406531230201 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (118 to 120)

Question Label : Comprehension

The probability density function (PDF) of a continuous random variable X

is given by:

$$f_X(x) = \begin{cases} kx^2, & 0 < x < 1, \\ 0, & \text{otherwise.} \end{cases}$$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 118 Question Id : 6406531230202 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Find the value of k .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

3

Question Number : 119 Question Id : 6406531230203 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Calculate the value of $F_X(0.5)$.

Options :

6406534156880. ✖ $\frac{1}{4}$

6406534156881. ✓ $\frac{1}{8}$

6406534156882. * $\frac{1}{2}$

6406534156883. * $\frac{1}{3}$

Question Number : 120 Question Id : 6406531230204 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

What is the value of $P(0.2 < X < 0.5)$?

Enter the answer correct to three

decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.114 to 0.120

Sem1 Statistics1

Section Id :	64065386895
Section Number :	6
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	14
Number of Questions to be attempted :	14
Section Marks :	40
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1

Sub-Section Id : 640653189527

Question Shuffling Allowed : No

Question Number : 121 Question Id : 6406531230205 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : SEMESTER I: STATISTICS 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 :

6406534156885. ✓ YES

6406534156886. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 640653189528

Question Shuffling Allowed : Yes

Question Number : 122 Question Id : 6406531230206 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

A box contains 10 marbles, 6 of which are red and 4 are blue. A sample of 4 marbles is randomly selected without replacement. Let the random variable X represent the number of red marbles in the selected sample. Identify the distribution of X .

Options :

6406534156887. ✓ Hypergeometric

6406534156888. ✗ Poisson

6406534156889. ✗ Binomial

6406534156890. ✗ Uniform

Sub-Section Number : 3

Sub-Section Id : 640653189529

Question Shuffling Allowed : Yes

Question Number : 123 Question Id : 6406531230207 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

The population standard deviation of the dataset $2, x, 10, 8, 14$ is 4, where x is an unknown quantity. Find the value of the population variance of the new dataset that is obtained by multiplying 2 to each number of the given dataset.

Options :

6406534156891. ✓ 64

6406534156892. ✗ 18

6406534156893. ✗ 16

6406534156894. ✗ 32

Sub-Section Number :

4

Sub-Section Id :

640653189530

Question Shuffling Allowed :

Yes

Question Number : 124 Question Id : 6406531230208 Question Type : MCQ**Correct Marks : 3**

Question Label : Multiple Choice Question

A license plate consists of 2 capital letter alphabets followed by 4 digits.

- The letters can be any of the capital letter alphabets, but no letter can be repeated.
- The digits can be chosen from {1, 3, 4, 5, 8}, with no repetition.

How many unique license plates can be formed?

Options :

6406534156895. ✗ 318240

6406534156896. ✓ 78000

6406534156897. ✗ 18720

6406534156898. ✗ 39000

Question Number : 125 Question Id : 6406531230209 Question Type : MCQ**Correct Marks : 3**

Question Label : Multiple Choice Question

A group of 7 people (A, B, C, D, E, F, G) is to be seated in a row for a photograph. Find the number of possible arrangements such that D and E cannot sit next to each other.

Options :

6406534156899. ✓ 3600

6406534156900. ✗ 4320

6406534156901. ✗ 5040

6406534156902. ✗ 720

Sub-Section Number :

5

Sub-Section Id :

640653189531

Question Shuffling Allowed :

Yes

Question Number : 126 Question Id : 6406531230210 Question Type : MSQ**Correct Marks : 2 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following option(s) is/are correct for a variable with an ordinal scale of measurement?

Options :

6406534156903. ✓ The data can be arranged in a meaningful order.

6406534156904. ✗ Arithmetic operations like addition and subtraction are valid.

6406534156905. ✗ The intervals between values are equal and meaningful.

6406534156906. ✓ The mode and median can be determined, but not the mean.

Sub-Section Number :

6

Sub-Section Id :

640653189532

Question Shuffling Allowed :

Yes

Question Number : 127 Question Id : 6406531230211 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Let X and Y be independent random variables such that $E[X] = 5$, $E[Y] = 7$ and $\text{Var}(X) = 4$. Suppose a random variable Z is defined as $Z = 2X + 3Y$. If $\text{Var}(Z) = 49$, then find the value of $\text{Var}(Y)$. Enter the answer correct to two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

3.64 to 3.70

Question Number : 128 Question Id : 6406531230212 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

A company classifies its customers into three categories based on their purchasing behavior: Regular, Occasional, and Rare. The probabilities of a customer being classified as Regular, Occasional and Rare are 0.5, 0.3 and 0.2, respectively. The probability that a customer makes a purchase, given their category, is:

- $P(\text{Purchase} \mid \text{Regular}) = 0.8$
- $P(\text{Purchase} \mid \text{Occasional}) = 0.4$
- $P(\text{Purchase} \mid \text{Rare}) = 0.1$

Find the probability that a randomly chosen customer makes a purchase. Enter the answer correct to two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.51 to 0.57

Sub-Section Number : 7

Sub-Section Id : 640653189533

Question Shuffling Allowed : Yes

Question Number : 129 Question Id : 6406531230213 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

A call center receives customer calls and the number of calls received per hour follows a Poisson distribution with a mean rate of 6 calls per hour. What is the probability that at most 2 calls are received in 30 minutes? Enter the answer correct to two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.39 to 0.45

Sub-Section Number : 8

Sub-Section Id : 640653189534

Question Shuffling Allowed : No

Question Id : 6406531230214 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (130 to 131)

Question Label : Comprehension

Consider a dataset such as 8, 12, 16, 24, and 20. Suppose we multiply all observations by 3. Based on the given information answer the subquestions.

Sub questions

Question Number : 130 Question Id : 6406531230215 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

What will be the 25th percentile of the new dataset?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

36

Question Number : 131 **Question Id :** 6406531230216 **Question Type :** SA

Correct Marks : 2

Question Label : Short Answer Question

Find IQR of the new dataset.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

24

Question Id : 6406531230217 **Question Type :** COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (132 to 133)

Question Label : Comprehension

Let $X \sim \text{Binomial}(n, 0.6)$. The expected value of X is 3.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 132 **Question Id :** 6406531230218 **Question Type :** MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Find the value of n and $\text{Var}(X)$.

Options :

6406534156912. ✘ $n=5, \sigma^2 = 1.8$

6406534156913. ✓ $n=5, \sigma^2 = 1.2$

6406534156914. ✘ $n=3, \sigma^2 = 1.2$

6406534156915. ✘ $n=3, \sigma^2 = 1.8$

Question Number : 133 Question Id : 6406531230219 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

What is the value of $P(X = 3)$?

Options :

6406534156916. ✘ 0.023

6406534156917. ✘ 0.230

6406534156918. ✓ 0.346

6406534156919. ✘ 0.035

Question Id : 6406531230220 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (134 to 135)

Question Label : Comprehension

A random variable X represents the number of items sold by a vendor in a day. The cumulative distribution function (CDF) of X is given below:

$$F(x) = \begin{cases} 0 & x < 0 \\ 0.15 & 0 \leq x < 1 \\ a & 1 \leq x < 2 \\ 0.75 & 2 \leq x < 3 \\ 1 & x \geq 3 \end{cases}$$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 134 Question Id : 6406531230221 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

If the probability that the vendor sells exactly 2 items in a day is 0.30, then find the value of a . Enter the answer correct to two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.43 to 0.47

Question Number : 135 Question Id : 6406531230222 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

What is the probability that the vendor sells at least 2 items in a day? Enter the answer correct to two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.53 to 0.57

Sub-Section Number : 9

Sub-Section Id : 640653189535

Question Shuffling Allowed : No

Question Id : 6406531230223 **Question Type :** COMPREHENSION **Sub Question Shuffling**

Allowed : No **Group Comprehension Questions :** No **Question Pattern Type :** NonMatrix

Question Numbers : (136 to 137)

Question Label : Comprehension

The probability mass function of a discrete random variable X is given by,

X	-2	0	2
$P(X = x)$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 136 **Question Id :** 6406531230224 **Question Type :** SA

Correct Marks : 3

Question Label : Short Answer Question

Find the value of $E(3X - 4)^2$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

Question Number : 137 Question Id : 6406531230225 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Determine the standard deviation of X .

Options :

6406534156923. ✘ 1

6406534156924. ✓ $\sqrt{2}$

6406534156925. ✘ 2

6406534156926. ✘ 4

Question Id : 6406531230226 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (138 to 139)

Question Label : Comprehension

The time taken by a coffee machine to brew a cup of coffee is uniformly distributed between 2 and b minutes. Based on this information, answer the given subquestions:

Sub questions

Question Number : 138 Question Id : 6406531230227 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

If the expected time for the coffee machine to brew a cup of coffee is 8.5 minutes, then find the value of b .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

15

Question Number : 139 Question Id : 6406531230228 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

If the coffee machine has been brewing for more than 6 minutes, what is the probability that it will finish brewing between 6 and 10 minutes?

Options :

4
6406534156928. ✓ $\frac{4}{9}$

4
6406534156929. ✗ $\frac{4}{13}$

9
6406534156930. ✗ $\frac{9}{13}$

2
6406534156931. ✗ $\frac{2}{9}$

Business Analytics

Section Id :	64065386896
Section Number :	7
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	17
Number of Questions to be attempted :	17
Section Marks :	45
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653189536
Question Shuffling Allowed :	No

Question Number : 140 Question Id : 6406531230229 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : BUSINESS ANALYTICS (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 :

6406534156932. ✓ YES

6406534156933. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 640653189537

Question Shuffling Allowed : Yes

Question Number : 141 Question Id : 6406531230230 Question Type : MSQ

Correct Marks : 1 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following distributions is/are not symmetric in nature (choose all that are applicable)?

Options :

6406534156934. ✗ Standard Normal distribution

6406534156935. ✗ Standard Binomial distribution

6406534156936. ✗ Uniform distribution

6406534156937. ✓ Poisson distribution

Question Number : 142 Question Id : 6406531230231 Question Type : MSQ

Correct Marks : 1 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following is/are required to build an empirical distribution? (choose all that are applicable)

Options :

6406534156938. ✓ PDF or PMF

6406534156939. ✓ Sample data

6406534156940. ✓ Summary Statistics

6406534156941. ✗ None of these

Question Number : 143 Question Id : 6406531230247 Question Type : MSQ

Correct Marks : 1 Max. Selectable Options : 0

Question Label : Multiple Select Question

Given the Chisquare table in Figure-2, what is the conclusion from the test at a 95% significance level? (choose all that may be applicable)

Options :

6406534156942. ✓ Optimization approach

6406534156943. ✗ Regression approach

6406534156944. ✗ Statistical approach

6406534156945. ✗ None of these

Question Number : 145 Question Id : 6406531230236 Question Type : MSQ

Correct Marks : 1.5 Max. Selectable Options : 0

Question Label : Multiple Select Question

The part worth can be defined as (choose all that may be applicable)

Options :

6406534156958. ✓ Level utilities

6406534156959. ✓ The utility for that level of attribute

6406534156960. ✓ Utility for separate parts of the products

6406534156961. ✗ None of these

Sub-Section Number :

4

Sub-Section Id :

640653189539

Question Shuffling Allowed :

Yes

Question Number : 146 Question Id : 6406531230233 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

In Figure-3 the customer wants to decide between the products O1 & O2, and x denotes the coordinates of the ideal product. Which of the following is/are true?

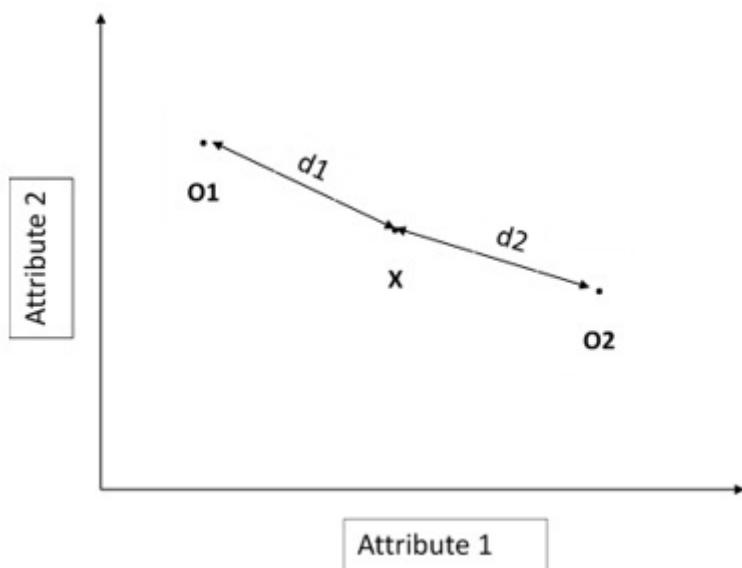


Figure-3

Options :

6406534156946. ✓ Customers will prefer O1 when $d_2 > d_1$

6406534156947. ✗ Customers will prefer O2 when $d_1 < d_2$

6406534156948. ❌ Both Customers will prefer O1 when $d_2 > d_1$ & Customers will prefer O2 when $d_1 < d_2$

6406534156949. ❌ None of these

Sub-Section Number :

5

Sub-Section Id :

640653189540

Question Shuffling Allowed :

Yes

Question Number : 147 Question Id : 6406531230234 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

There are 7 business units and you are using the DEA to compare them. You solve the LP for business unit 5. You find from the constraint expression that business unit 1 has obtained an efficiency of 1 and business unit 2 has obtained an efficiency of 1 with the optimal weights of business unit 5. Which of the following statements is correct? (choose all that is/are applicable)

Options :

6406534156950. ❌ Business unit 5 is inefficient

6406534156951. ✓ Business unit 1 is efficient

6406534156952. ❌ Business unit 5 is efficient

6406534156953. ✓ Business unit 2 is efficient

Question Number : 148 Question Id : 6406531230235 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

In DEA, when can the Linear Programming model be used for calculating the weights of efficiency (weighted outputs/weighted inputs)? (choose all that is/are applicable)

Options :

6406534156954. ✓ After converting the ratio into the linear objective function

6406534156955. ✓ After normalizing the denominator

6406534156956. ✓ By setting a constraint on the efficiency of all DMUs to be lesser than or equal to 1

6406534156957. ❌ None of these

Sub-Section Number :

6

Sub-Section Id :

640653189541

Question Shuffling Allowed :

No

Question Id : 6406531230237 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (149 to 153)

Question Label : Comprehension

(The following is a purely imaginary scenario)

A demand response curve is modelled using linear regression. The partial regression output is given in Figure-1 below. Given this information, answer the subquestions.

ANOVA		
	df	SS
Regression		7076613
Residual		
Total	9	7184891

	Coefficients	Standard Error
Intercept	39942	
X Variable 1	-29.5	

Figure-1

Sub questions

Question Number : 149 Question Id : 6406531230238 Question Type : SA

Correct Marks : 1.5

Question Label : Short Answer Question

What is the elasticity of the demand response curve at a price of Rs. 50? (*Note: Enter the answer rounded to two decimal places. For example, if the answer is "1.234", then enter it as "1.23"*)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.02 to 0.05

Question Number : 150 Question Id : 6406531230239 Question Type : SA

Correct Marks : 0.5

Question Label : Short Answer Question

What is the market size? (*Note: Enter the answer rounded to two decimal places. For example, if the answer is "1.234", then enter it as "1.23"*)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

39942

Question Number : 151 Question Id : 6406531230240 Question Type : SA

Correct Marks : 0.5

Question Label : Short Answer Question

What is the satiating price? (*Note: Enter the answer rounded to two decimal places. For example, if the answer is "1.234", then enter it as "1.23"*)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

1352 to 1355

Question Number : 152 Question Id : 6406531230241 Question Type : MCQ

Correct Marks : 0.5

Question Label : Multiple Choice Question

Based on the elasticity, which of the following statements are **TRUE**

Options :

6406534156965. ❌ The demand is elastic

6406534156966. ✓ The demand is inelastic

6406534156967. ❌ The price is elastic

6406534156968. ❌ The price is inelastic

Question Number : 153 Question Id : 6406531230242 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

What **percentage** of the total linear variability in demand is captured by this model (given in figure-1)? (*Note: Enter the answer in "**percentage rounded to two decimal places** without the percentage sign. For example, if the answer is "1.234%", then enter it as "1.23"*)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

98.00 to 99.00

Question Id : 6406531230254 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (154 to 156)

Question Label : Comprehension

(The following is a purely imaginary scenario)

A survey was conducted among 100 students who participated in all events at IITMs recent "Saarang" event. The students were asked to rate various aspects of their experience on a scale of "-5 to +5", where "-5" indicates a very negative experience and "+5" indicates a very positive experience. The average student rating for each event was taken across four key parameters: "Event Ambience", "Fairness of Event Judges", "Event Conduct", "Event Prize Money". The target variable was "Event Performance" which measures the overall performance of each event.

Based on the collected data, a correlation matrix as specified in Table-2 is obtained for the independent variables. With this information, answer the given sub-questions

	Pairwise Correlation Values			
	Event Ambience	Fairness of Event Judges	Event Conduct	Event Prize Money
Event Ambience	1	-0.04	0.49	0.55
Fairness of Event Judges	-0.04	1	-0.011	0.022
Event Conduct	0.49	-0.011	1	-0.51
Event Prize Money	0.55	0.022	-0.51	1

Table-2

Sub questions

Question Number : 154 Question Id : 6406531230255 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

What would be the R-Square value if a model is built with "Event Conduct" as the independent variable and "Event Prize Money" as the dependent variable? (*Note: Enter the answer in percentage rounded to two decimal places without the "%" symbol. For example, if the answer is "1.234%", then enter it as "1.23"*)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

25.00 to 27.00

Question Number : 155 Question Id : 6406531230256 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

What would be the Adjusted R-Square value if a model is built between "Fairness of Event Judges" as the independent variable and "Event Ambience" as the dependent variable? (*Note: Enter the answer in percentage rounded to two decimal places without the "%" symbol. For example, if the answer is "1.234%", then enter it as "1.23"*)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

15.00 to 16.00

Question Number : 156 Question Id : 6406531230257 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

What will be the percentage increase in the standard error corresponding to the beta value of "Event Ambience", if a multiple linear regression model where both "Event Ambience" and "Event Price Money" are used as explanatory variables to predict "Event Performance"? (*Note: Enter the answer in percentage rounded to two decimal places. For example, if the answer is "1.234%", then enter it as "1.23"*)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

18.00 to 20.00

Question Id : 6406531230264 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (157 to 158)

Question Label : Comprehension

There are six business units. There are two outputs and one input under consideration. You are solving the optimization problem for business unit 3, and you find that the efficiency is 0.8. You see that the dual variables corresponding to the constraints of business units 2 and 5 are non-zero, and the dual variables corresponding to the constraints of other units are zero. The dual variables corresponding to the constraints of business units 2 and 5 are 0.5 and 0.3, respectively. Based on Table 6, answers the given sub-questions

	Output 1	Output 2
BU 2	9000	10
BU 5	6500	12

Table 6: DEA Table

Sub questions

Question Number : 157 Question Id : 6406531230265 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

How much will the Output 1 in HCU 3?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

8061 to 8064

Question Number : 158 Question Id : 6406531230266 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

How much will the Output 2 in HCU 3?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

10.5 to 11

Sub-Section Number : 7

Sub-Section Id : 640653189542

Question Shuffling Allowed : No

Question Id : 6406531230243 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (159 to 161)

Question Label : Comprehension

(The following is a purely imaginary scenario)

Ms. Teddy, is the owner of a toy manufacturing company. The company produces its iconic "Teddy Bear" toys in a facility that operates for 8 hours a day, and 20 days in month. Ms. Teddy has recently completed the BA course and wants to see if her manufacturing facility is producing toys where the defects per ship follows a Poisson distribution. Accordingly, she collected data for the past month indicating the number of defects produced in a shift. This is provided in Table-1. Using this information answer the given sub-questions

Production Day in the Month	Number of Defective Teddy Bears Produced
Day-1	5
Day-2	0
Day-3	4
Day-4	0
Day-5	4
Day-6	4
Day-7	2
Day-8	5
Day-9	3
Day-10	3
Day-11	1
Day-12	5
Day-13	2
Day-14	1
Day-15	5
Day-16	5
Day-17	2
Day-18	1
Day-19	1
Day-20	1

Table-1

Sub questions

Question Number : 159 Question Id : 6406531230244 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

How many bins will be present in the frequency table for the statistical test to be conducted? (*Note: Enter an INTEGER answer*)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

6

Question Number : 160 Question Id : 6406531230245 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

What is the value of the computed test statistic for the statistical test that is to be performed by Ms. Teddy to verify her claim? (*Note: Enter the answer rounded to two decimal places. For example, if the answer is "1.234", then enter it as "1.23"*)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

589.00 to 592.00

Question Number : 161 Question Id : 6406531230246 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

How many degrees of freedom is present for the test statistic that is to be conducted by Ms. Teddy? *(Note: Enter an INTEGER answer)*

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

4

Sub-Section Number : 8

Sub-Section Id : 640653189543

Question Shuffling Allowed : No

Question Id : 6406531230248 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (162 to 163)

Question Label : Comprehension

(The following is a purely imaginary scenario)

The relationship between Demand "D" and Selling Price "P" is given by the equation $D(p) = 780 - 9*P$. Then answer the given sub-questions.

Sub questions

Question Number : 162 Question Id : 6406531230249 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

If the intention is to maximize the profit, then what is the optimal selling price if the item is going to be made at Rs. 30 per unit? *(Note: Enter the answer rounded to two decimal places. For example, if the answer is "1.234", then enter it as "1.23"*

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

58.00 to 59.00

Question Number : 163 Question Id : 6406531230250 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

What is the maximum profit that can be generated? (*Note: Enter the answer rounded to two decimal places. For example, if the answer is "1.234", then enter it as "1.23"*)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

20424.00 to 20425.00

Question Id : 6406531230267 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (164 to 166)

Question Label : Comprehension

As a Business Analyst, we are trying to find the DMUs that are efficient, where there are 2 outputs (Number of Leads & Sales) and one constant input. Based on the graph given in Figure-4 below, answer the given sub-questions

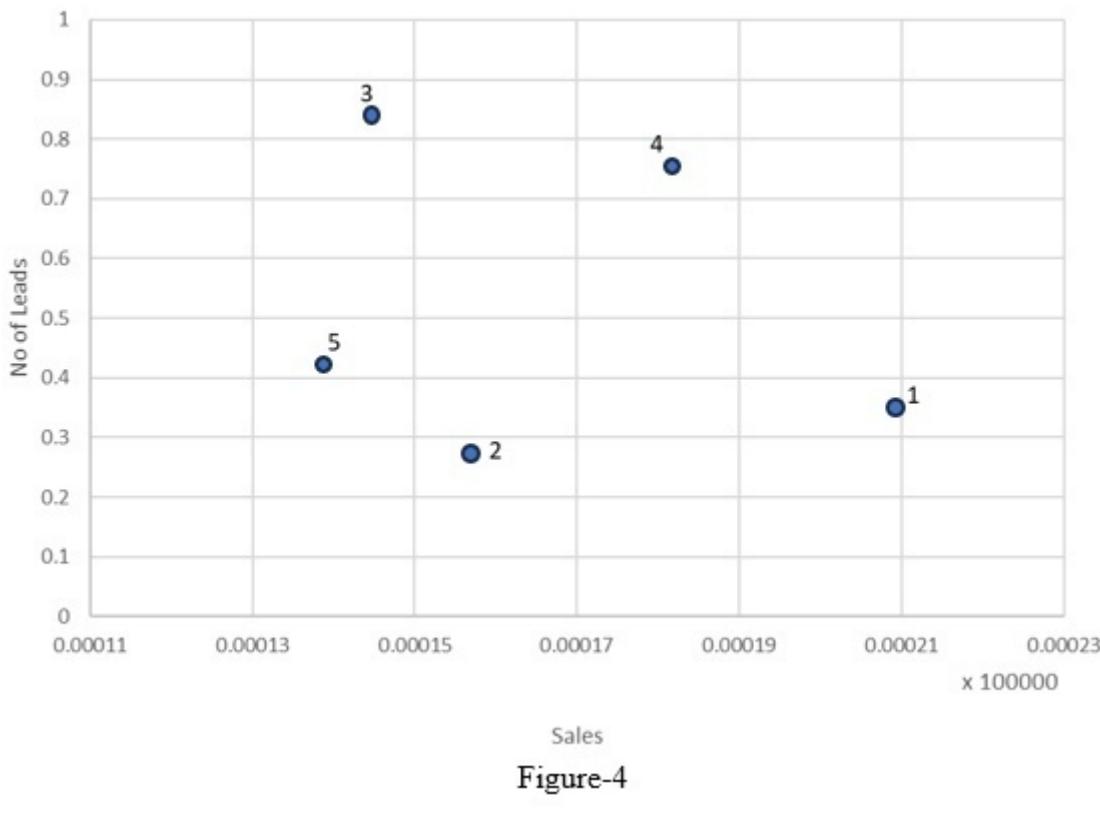


Figure-4

Sub questions

Question Number : 164 Question Id : 6406531230268 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Which DMUs are in the economic frontier?

Options :

6406534156999. ✘ (3,2,1)

6406534157000. ✘ (3,2,5)

6406534157001. ✘ (4,5,2)

6406534157002. ✓ (3,4,1)

Question Number : 165 Question Id : 6406531230269 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Which DMUs are the reference units for DMU 2?

Options :

6406534157003. ✘ (5,4)

6406534157004. ✓ (4,1)

6406534157005. ✘ (3,5)

6406534157006. ✘ (3,1)

Question Number : 166 Question Id : 6406531230270 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Which DMUs are the reference units for DMU 5?

Options :

6406534157007. ✘ (1,4)

6406534157008. ✘ (1,3)

6406534157009. ✓ (3,4)

6406534157010. ✘ None of these

Sub-Section Number :

9

Sub-Section Id :

640653189544

Question Shuffling Allowed :

No

Question Id : 6406531230251 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (167 to 168)

Question Label : Comprehension

(The following is a purely imaginary scenario)

An insurance company believes that people can be divided into two classes: "*Class-1: Those who are accident prone*" and "*Class-2: Those who are not accident prone*". The company's statistics show that an accident-prone person will have an accident at sometime within a faxed 1-year period with probability 0.4, whereas this probability decreases to 0.2 for a person who is not accident prone. It is assumed that 30 percent of the human population is accident prone. Given this information, answer the sub-questions

Sub questions

Question Number : 167 Question Id : 6406531230252 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

What is the probability that a new policyholder will have an accident within a year of purchasing a policy? (*Note: Enter the answer **rounded to two decimal places**. For example, if the answer is "1.234", then enter it as "1.23"*)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.25 to 0.27

Question Number : 168 Question Id : 6406531230253 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Suppose a new policyholder has an accident within a year of purchasing a policy. Then, what is the probability that the person is accident prone? (*Note: Enter the answer rounded to two decimal places. For example, if the answer is "1.234", then enter it as "1.23"*)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.44 to 0.48

Sub-Section Number : 10

Sub-Section Id : 640653189545

Question Shuffling Allowed : No

Question Id : 6406531230258 **Question Type :** COMPREHENSION **Sub Question Shuffling**

Allowed : No **Group Comprehension Questions :** No **Question Pattern Type :** NonMatrix

Question Numbers : (169 to 173)

Question Label : Comprehension

A fintech company wants to assess the performance of its classification model, which predicts loan approval (positive class) or rejection (negative class). Table 3 presents the data used for model development, while Table 4 provides the estimated coefficients from the logistic regression model. To validate the model, the actual loan decisions made by the fintech company are shown in Table 5.

Cust_id	Salary	Age
1	60	30
2	9	35
3	8	40
4	16	25
5	15	50
6	50	21

Table 3: Data used for Building a Logistic Regression Model

Threshold	0.35
b_0	0.03
b_1	0.04
b_2	-0.03

Table 4: Estimated Coefficients from Logistic Regression

Y_act
1
1
0
0
0
0

Table 5: The actual loan decisions

Based on the provided data, answer the given sub-questions

Sub questions

Question Number : 169 Question Id : 6406531230259 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

What is the precision of class 1?

(Note: Enter the answer in percentage rounded to two decimal places. For example, if the answer is "10.235%", then enter it as "10.24")

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

33.32 to 33.34

Question Number : 170 Question Id : 6406531230260 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

What is the sensitivity of the model?

(Note: Enter the answer in percentage rounded to two decimal places. For example, if the answer is "10.235%", then enter it as "10.24")

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

49.95 to 50.05

Question Number : 171 Question Id : 6406531230261 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

What is the specificity of the model?

(Note: Enter the answer in percentage rounded to two decimal places. For example, if the answer is "10.235%", then enter it as "10.24")

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

49.95 to 50.05

Question Number : 172 Question Id : 6406531230262 Question Type : MSQ

Correct Marks : 1.5 Max. Selectable Options : 0

Question Label : Multiple Select Question

What is the correct interpretation of the coefficient b1? (Choose that is/are applicable)

Options :

6406534156991. ✓ If the salary increases by 1 unit, the log of odds of the application acceptance increases by 0.04.

6406534156992. ✓ If the salary increases by 1 unit, the odds of the application getting accepted increase by 4% ($e^{0.4} = 1.04$)

6406534156993. ✗ None of these

Question Number : 173 Question Id : 6406531230263 Question Type : MSQ

Correct Marks : 1.5 Max. Selectable Options : 0

Question Label : Multiple Select Question

What is the correct interpretation of the coefficient b2? (Choose that is/are applicable)

Options :

6406534156994. ✓ If the age increases by 1 unit, the log of odds of the application acceptance decreases by 0.03.

6406534156995. ✓ If the age increases by 1 unit, the odds of the application getting accepted decrease by 3% ($e^{-0.03} = 0.97$).

6406534156996. ✘ None of these

BDM

Section Id :	64065386897
Section Number :	8
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	17
Number of Questions to be attempted :	17
Section Marks :	30
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653189546
Question Shuffling Allowed :	No

Question Number : 174 Question Id : 6406531230271 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : BUSINESS DATA MANAGEMENT (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 :

6406534157011. ✓ YES

6406534157012. ✗ NO

Sub-Section Number :

2

Sub-Section Id :

640653189547

Question Shuffling Allowed :

Yes

Question Number : 175 Question Id : 6406531230272 Question Type : MCQ**Correct Marks : 1**

Question Label : Multiple Choice Question

What does the law of demand state?

Options :

6406534157013. ✓ As the price of a good increases, the quantity demanded decreases

6406534157014. ✗ As the price of a good decreases, the quantity demanded decreases

6406534157015. ✗ As the price of a good increases, the quantity supplied decreases

6406534157016. ✗ As the price of a good decreases, the quantity supplied increases

Question Number : 176 Question Id : 6406531230273 Question Type : MCQ**Correct Marks : 1**

Question Label : Multiple Choice Question

Which function would you use to count the number of cells that meet a specific condition?

Options :

6406534157017. ✗ COUNT

6406534157018. ✗ COUNTA

6406534157019. ✓ COUNTIF

6406534157020. ✗ COUNTSUM

Question Number : 177 Question Id : 6406531230275 Question Type : MCQ**Correct Marks : 1**

Question Label : Multiple Choice Question

In a saturated smartphone market where 70% of current users express interest in upgrading their phones in the next two months, and the no. of new smartphone users remain unchanged, what should companies/manufacturers prioritize?

Options :

6406534157025. ✗ Expand distribution channels to reach untapped geographic regions.

6406534157026. ✗ Focus on females as their target customers.

6406534157027. ✗ Invest in research and development to create innovative features for new customers.

6406534157028. ✓ Develop targeted upgrade incentives and promotions for current users looking to replace their old devices

Question Number : 178 Question Id : 6406531230276 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

What does the Days of Sales of Inventory indicate?

Options :

6406534157029. ✓ The average number of days required by a company to turn its inventory into sales.

6406534157030. ✗ The number of days when inventory is zero in a year

6406534157031. ✗ Total number of days when inventory sales is zero due to lack of inventory

6406534157032. ✗ The average number of inventory stockout days in a month

Question Number : 179 Question Id : 6406531230277 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Which of the following factors is most critical in determining the market potential for a new product ?

Options :

6406534157033. ✓ The size of the target market and percentage of potential customers interested in the product.

6406534157034. ✗ Historical sale data of unrelated products.

6406534157035. ✗ Cost of production and distribution.

6406534157036. ✗ Current market share of existing products.

Question Number : 180 Question Id : 6406531230291 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Which metric is most important to monitor during an A/B test?

Options :

6406534157065. ✗ Total number of users tested in the experiment

6406534157066. ✗ Uptime of the system

6406534157067. ✓ Key performance indicators (KPIs) specific to the experiment

6406534157068. ✗ Model training time

Question Number : 181 Question Id : 6406531230293 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Arrange the following steps while working with unstructured data in a ranking modelling:

I. Normalizing

II. Preprocessing

III. Ranking

IV. Composite score

Options :

6406534157074. ✘ I -> II -> III -> IV

6406534157075. ✓ II -> I -> IV -> III

6406534157076. ✘ I -> II -> I -> IV -> III

6406534157077. ✘ I -> II -> I -> III -> IV

Question Number : 182 Question Id : 6406531230294 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

If a FinTech company wants to cut down losses, which of the following should they do?

Options :

6406534157078. ✘ Decrease approval cutoff of credit score

6406534157079. ✘ Increase interest rate

6406534157080. ✘ Increase approval limit for loans

6406534157081. ✓ Increase approval cutoff of credit score

6406534157082. ✘ Give more loans

Sub-Section Number :

3

Sub-Section Id :

640653189548

Question Shuffling Allowed :

Yes

Question Number : 183 Question Id : 6406531230292 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

PayBuddy conducted an A/B test to understand if their new Funding Instrument recommendation strategy works well. Following are the details of the control and treatment groups. From the given table, which of the following statements are true?

- i. Value of Credit transactions increased with the new recommendation strategy
- ii. Value of Debit transactions increased with the new recommendation strategy
- iii. Value of both Credit and Debit transactions increased with the new recommendation strategy
- iv. Value of Credit transactions decreased with the new recommendation strategy
- v. Value of Debit transactions decreased with the new recommendation strategy

Group	Average sum of credit transactions per customer	Average sum of debit transactions per customer
Treatment	1725 \$	2780 \$
Control	1810 \$	2679 \$

Options :

6406534157069. ✘ Both (i) & (v)

6406534157070. ✘ Only (iii)

6406534157071. ✘ Only (i)

6406534157072. ✓ Both (ii) & (iv)

6406534157073. ✘ Only (v)

Question Number : 184 Question Id : 6406531230299 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

PePhone is a FinTech firm that processes payments. Following are sources of revenue for the company – 3.5% of transaction amount as transaction fee from merchant for all types of transactions (credit and debit), 18% p.a. interest on credit transactions and incurs a loss of credit if not paid back. Calculate the overall profit for the company based on the below table – (Assume payback of credit in a year)

Note: Declined transactions will not get credit but customers will complete the payment through PePhone using their bank details.

Cust ID	Date of Application	Cust Segment	Application Credit Score	Application Amount	Approved_vs_Designated	Decline Reason	Paid Back or Defaulted
17289	26/03/21	Low	588	168	Approved		Paid Back
17290	17/02/21	Mid	635	109	Approved		Defaulted
17291	23/02/21	High	455	183	Declined	System Issue	NA
17292	20/02/21	Mid	484	334	Declined	Credit Risk	NA
17293	05/02/21	Mid	637	102	Approved		Defaulted
17294	11/01/21	Mid	559	499	Declined	Credit Risk	NA

Options :

6406534157095. ✘ - 211.0

6406534157096. ✓ - 192.72

6406534157097. ✘ -131.94

6406534157098. ✘ - 162.18

Sub-Section Number :

4

Sub-Section Id :

640653189549

Question Shuffling Allowed :

Yes

Question Number : 185 Question Id : 6406531230274 Question Type : MSQ

Correct Marks : 1 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following conditions can use the concept of "weighted average" to analyse expenditure data?

Options :

6406534157021. ✓ By considering importance of expenditure categories

6406534157022. ✓ By considering the population size of different regions

6406534157023. ❖ By adjusting for inflation over time

6406534157024. ❖ By analyzing the impact of income levels on expenditure

Sub-Section Number :

5

Sub-Section Id :

640653189550

Question Shuffling Allowed :

Yes

Question Number : 186 Question Id : 6406531230278 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

In Excel, the **SUBTOTAL** function is used to perform calculations on a filtered range of data. Which of the following statements about the **SUBTOTAL** function is **correct**?

Options :

6406534157037. ✓ SUBTOTAL can only calculate the sum of a range and ignores hidden rows in the filtered data.

6406534157038. ✓ SUBTOTAL can perform various calculations, including sum, average, count, and more, and it ignores rows hidden by filters.

6406534157039. ❖ SUBTOTAL performs calculations only on rows that are manually hidden, not those hidden by filters.

6406534157040. ❖ SUBTOTAL can calculate results based on data in any worksheet, regardless of whether the data is visible or hidden.

Sub-Section Number :

6

Sub-Section Id :

640653189551

Question Shuffling Allowed :

No

Question Id : 6406531230279 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (187 to 188)

Question Label : Comprehension

Based on the sample data given answer the subquestions.

	Income Level 1	Income Level 2
Income	Rs 15000	Rs 25000
Qty demanded	60 units	90 units
Price per qty	Rs 40	Rs 38

Sub questions

Question Number : 187 Question Id : 6406531230280 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Determine the percentage change in total revenue when income increases from Rs 15000 to Rs 25000.

Options :

6406534157041. ✘ 41.2%

6406534157042. ✘ 42%

6406534157043. ✓ 42.5%

6406534157044. ✘ 41.8%

Question Number : 188 Question Id : 6406531230281 Question Type : MCQ**Correct Marks : 1**

Question Label : Multiple Choice Question

What is the type of goods based on the given table?

Options :

6406534157045. ✓ Normal Goods

6406534157046. ✘ Inferior Goods

6406534157047. ✘ Luxury Goods

6406534157048. ✘ None of these

Sub-Section Number :

7

Sub-Section Id :

640653189552

Question Shuffling Allowed :

No

Question Id : 6406531230282 Question Type : COMPREHENSION Sub Question Shuffling**Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix****Question Numbers : (189 to 191)**

Question Label : Comprehension

Based on following data, answer the given subquestions:

Product	Prod. ID	Month 1 Sales	Month 2 Sales	Month 3 Sales	Unit Price (\$)
Widget A	SKU01	120	150	130	25
Widget B	SKU02	80	90	70	15
Gadget X	SKU03	200	180	210	40
Gadget Y	SKU04	50	60	55	50
Accessory Z	SKU05	30	40	35	30
Widget C	SKU06	100	110	120	20
Gadget Q	SKU07	90	100	95	35
Accessory X	SKU08	60	70	65	10

Sub questions**Question Number : 189 Question Id : 6406531230283 Question Type : MCQ****Correct Marks : 2**

Question Label : Multiple Choice Question

The total revenue of the firm is:

Options :

6406534157049. ✓ 67125

6406534157050. ✗ 66895

6406534157051. ✗ 65285

6406534157052. ✗ 67565

Question Number : 190 Question Id : 6406531230284 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

In terms of sales trend, which product has a continuously increasing trend?

Options :

6406534157053. ✗ Gadget X

6406534157054. ✗ Widget A

6406534157055. ✓ Widget C

6406534157056. ✗ Gadget Q

Question Number : 191 Question Id : 6406531230285 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

What percentage of total revenue do Widgets contribute?

Options :

6406534157057. ✓ 30.1%

6406534157058. ✗ 42.4%

6406534157059. ✗ 25.6%

6406534157060. ✗ 35.5%

Question Id : 6406531230286 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (192 to 195)

Question Label : Comprehension

Based on the data in the table, Calculate the missing values X1, X2, X3 & X4 and answer the given subquestions.

Planned Production Time (hrs)	Lost Time (hrs)	Actual Machine Speed (units/hr)	Design Machine Speed (units/hr)	Good Units Produced	Availability (%)	Performance (%)	Quality (%)	OEE (%)
8	X1	X2	200	1050	87.50%	90%	X3	X4

Sub questions

Question Number : 192 Question Id : 6406531230287 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

X1:

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 193 Question Id : 6406531230288 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

X2:

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

180

Question Number : 194 Question Id : 6406531230289 Question Type : SA

Correct Marks : 1.5

Question Label : Short Answer Question

X3 (in%):

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

83 to 83.5

Question Number : 195 Question Id : 6406531230290 Question Type : SA

Correct Marks : 1.5

Question Label : Short Answer Question

X4 (in%):

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

65 to 65.75

Sub-Section Number : 8

Sub-Section Id : 640653189553

Question Shuffling Allowed : No

Question Id : 6406531230295 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (196 to 198)

Question Label : Comprehension

Match the following

1. A form created by HR that outlines the budgetary details, skills and capabilities required etc.	a) Appraisal
2. Organization source talent by asking their existing employees to recommend candidates from their existing networks.	b) Indent
3. The process of evaluating an employee's current and/or past performance	c) Employee referral

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 196 Question Id : 6406531230296 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

A form created by HR that outlines the budgetary details, skills and capabilities required etc.

Options :

6406534157083. ✘ Appraisal

6406534157084. ✓ Indent

6406534157085. ✘ Employee referral

6406534157086. ✘ None of these

Question Number : 197 Question Id : 6406531230297 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Organization source talent by asking their existing employees to recommend candidates from their existing networks.

Options :

- 6406534157087. ✘ Appraisal
- 6406534157088. ✘ Indent
- 6406534157089. ✓ Employee referral
- 6406534157090. ✘ None of these

Question Number : 198 Question Id : 6406531230298 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

The process of evaluating an employee's current and/or past performance

Options :

- 6406534157091. ✓ Appraisal
- 6406534157092. ✘ Indent
- 6406534157093. ✘ Employee referral
- 6406534157094. ✘ None of these

DBMS

Section Id :	64065386898
Section Number :	9
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	50
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653189554
Question Shuffling Allowed :	No

Question Number : 199 Question Id : 6406531230300 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : DATABASE MANAGEMENT SYSTEMS (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 :

6406534157099. ✓ YES

6406534157100. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 640653189555

Question Shuffling Allowed : Yes

Question Number : 200 Question Id : 6406531230301 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Consider a B+-tree index to be built on the attribute StudentID of a table Students, with the following properties:

- The length of the attribute StudentID is 10 bytes.
- The size of each child pointer is 14 bytes.
- The size of each disk block size is 470 bytes.

With the given information, what is the best choice for the order of the non-leaf nodes of the B+-tree?

Options :

6406534157101. ✗ 19

6406534157102. ✓ 20

6406534157103. ✗ 21

6406534157104. ✗ 22

Question Number : 201 Question Id : 6406531230303 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Consider a log of a transaction as shown below, where the immediate database modification scheme is used.

step	log details
1	$\langle T_1, start \rangle$
2	$\langle T_1, A, 1000, 700 \rangle$
3	$\langle T_1, B, 600, 450 \rangle$
4	$\langle T_1, C, 800, 1300 \rangle$
5	$\langle T_1, Commit \rangle$

Table 1: log table

Suppose the transaction failed before step 5, then which of the following is true?

Options :

6406534157109. ✘ T_1 : Undo and log records $\langle T_1, C800 \rangle, \langle T_1, Abort \rangle$ are written out.

T_1 : Redo and log records $\langle T_1, A1000 \rangle, \langle T_1, B600 \rangle, \langle T_1, C800 \rangle,$

6406534157110. ✘ $\langle T_1, Abort \rangle$ are written out.

T_1 : Undo and log records $\langle T_1, A1000 \rangle, \langle T_1, B600 \rangle, \langle T_1, C800 \rangle,$

6406534157111. ✓ $\langle T_1, Abort \rangle$ are written out.

6406534157112. ✘ T_1 : Redo and log records $\langle T_1, C800 \rangle, \langle T_1, Abort \rangle$ are written out.

Question Number : 202 Question Id : 6406531230304 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Consider the following monthly backup schedule used by a company:

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
1/ Full	2/ Incremental	3/ Incremental	4/ Incremental	5/ Incremental	6/ Incremental	7/ Differential
8/ Incremental	9/ Incremental	10/ Incremental	11/ Incremental	12/ Differential	13/ Incremental	14/ Incremental
15/ Incremental	16/ Incremental	17/ Differential	18/ Incremental	19/ Incremental	20/ Incremental	21/ Incremental
22/ Differential	23/ Incremental	24/ Incremental	25/ Incremental	26/ Incremental	27/ Incremental	28/ Incremental
29/ Incremental	30/ Incremental					

If a failure occurs on the 12th day of the month before the backup for the day has been completed, how many backup sets have to be loaded for a full recovery?

Options :

6406534157113. ✘ 4

6406534157114. ✘ 5

6406534157115. ✓ 6

6406534157116. ✘ 7

Question Number : 203 Question Id : 6406531230307 Question Type : MCQ**Correct Marks : 2**

Question Label : Multiple Choice Question

Consider the following relational schema:

Product(ProductID, *ProductName*, *CategoryID*, *Price*)Category(CategoryId, *CategoryName*)

Choose the correct SQL query to find the names of categories where the average price of products in that category is greater than the average price of all products.

Options :

```
SELECT c.CategoryName
FROM Category c
INNER JOIN Product p ON c.CategoryID = p.CategoryID
GROUP BY c.CategoryName
6406534157125. ✓ HAVING AVG(p.Price) > (SELECT AVG(Price) FROM Product);
```

```
SELECT c.CategoryName
FROM Category c
INNER JOIN Product p ON c.CategoryID = p.CategoryID
GROUP BY c.CategoryName
6406534157126. ✘ Having AVG(Price) > (SELECT Price FROM Product);
```

```
SELECT c.CategoryName
FROM Category c
INNER JOIN Product p ON c.CategoryID = p.CategoryID
WHERE AVG(p.Price) > (SELECT Price FROM Product);
6406534157127. ✘ GROUP BY c.CategoryName
```

```
SELECT c.CategoryName
FROM Category c
INNER JOIN Product p ON c.CategoryID = p.CategoryID
GROUP BY p.ProductID
6406534157128. ✘ Having AVG(p.Price) > (SELECT Price FROM Product);
```

Sub-Section Number :

3

Sub-Section Id :

640653189556

Question Shuffling Allowed :

Yes

Question Number : 204 Question Id : 6406531230302 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the hash functions given below.

- $h_1(n) = (n) \bmod 5,$
- $h_2(n) = (n^2 + 1) \bmod 7,$
- $h_3(n) = (3n + 3) \bmod 20,$
- $h_4(n) = (\lfloor n/2 \rfloor + 3) \bmod 8.$

Identify the hash function(s), that can generate unique hash values for the following search key values: 15,27,34,22,18.

Options :

6406534157105. ✘ $h_1(n)$

6406534157106. ✘ $h_2(n)$

6406534157107. ✓ $h_3(n)$

6406534157108. ✘ $h_4(n)$

Question Number : 205 Question Id : 6406531230305 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following relational schema:

Employee(emp_id, first_name, last_name, dept_id)

Department(dept_id, dept_name, mngr_id)

Manager(mngr_id, mngr_name)

Questions:

1. Find the first names of employees whose names start with 'J' and contain at least 6 characters.
2. Find the total number of employees in each department.
3. List the department names managed by a manager named 'Brown'.

SQL queries:

- a. SELECT first_name FROM Employee WHERE first_name LIKE 'J_____';
- b. SELECT first_name FROM Employee WHERE first_name LIKE 'J_____%';
- c. SELECT dept_id, COUNT(emp_id) FROM Employee GROUP BY emp_id;
- d. SELECT dept_id, COUNT(emp_id) FROM Employee GROUP BY dept_id;
- e. SELECT DISTINCT d.dept_name FROM Department d INNER JOIN Manager m ON d.mngr_id = m.mngr_id WHERE m.mngr_name = 'Brown';
- f. SELECT DISTINCT d.dept_name FROM Department d, Manager m WHERE d.mngr_id = m.mngr_id AND m.mngr_name = 'Brown';

Match the correct SQL queries with the corresponding Questions.

Options :

6406534157117. ✘ 1-a, 2-c, 3-f

6406534157118. ✘ 1-b, 2-c, 3-e

6406534157119. ✘ 1-a, 2-d, 3-e

6406534157120. ✓ 1-b, 2-d, 3-f

Sub-Section Number :

4

Sub-Section Id :

640653189557

Question Shuffling Allowed :

Yes

Question Number : 206 Question Id : 6406531230309 Question Type : MSQ

Correct Marks : 1 Max. Selectable Options : 0

Question Label : Multiple Select Question

Choose the correct statement(s).

Options :

6406534157133. ✓ In static hashing, the size of the hash table remains fixed, which may lead to overflow or underutilization of space.

6406534157134. ✓ In dynamic hashing, the hash table grows and shrinks dynamically as data is inserted or deleted.

6406534157135. ✘ Static hashing is more efficient for applications where the number of records is expected to change frequently.

6406534157136. ❌ Dynamic hashing does not handle collisions effectively compared to static hashing.

Sub-Section Number :

5

Sub-Section Id :

640653189558

Question Shuffling Allowed :

Yes

Question Number : 207 Question Id : 6406531230306 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the instance of a relation R. Which among the following functional dependencies set(s) can be inferred from the given information?

P	Q	R	S
p1	q1	r1	s1
p2	q2	r2	s2
p3	q3	r3	s3
p1	q1	r1	s1
p4	q4	r4	s4
p2	q1	r2	s2

Table 2: Relation R

Options :

6406534157121. ❌ $\{P \rightarrow Q, Q \rightarrow R, PR \rightarrow S, S \rightarrow Q\}$

6406534157122. ❌ $\{PQ \rightarrow R, S \rightarrow P, PR \rightarrow Q, QS \rightarrow R\}$

6406534157123. ❌ $\{P \rightarrow R, Q \rightarrow S, PQ \rightarrow R, S \rightarrow Q\}$

6406534157124. ✓ $\{PQ \rightarrow R, PR \rightarrow S, P \rightarrow R, QS \rightarrow R\}$

Question Number : 208 Question Id : 6406531230310 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the Employee table given below:

EmpID	Name	Dept	Salary
001	Harry	IT	80000
002	Louis	HR	75000
003	Liam	Finance	60000
004	Niall	IT	75000
005	Zayn	IT	68000

Table 4: Employee Table

Which of the following relational algebra expression(s) correctly retrieves the names of employees working in the IT department who earn more than 70,000?

Options :

6406534157137. ✓ $\pi_{Name}(\sigma_{Dept='IT' \wedge Salary > 70000}(Employee))$

6406534157138. ✗ $\pi_{Name, Salary > 70000}(\sigma_{Dept='IT'}(Employee))$

6406534157139. ✗ $\pi_{Name}(\sigma_{Dept='IT' \vee Salary > 70000}(Employee))$

6406534157140. ✓ $\pi_{Name}(\sigma_{Salary > 70000}(\sigma_{Dept='IT'}(Employee)))$

Question Number : 209 Question Id : 6406531230311 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the following relational schema for a University system:

Student(student_id, name, age, dept)

Course(course_id, course_name, dept, credits)

Enrollment(student_id, course_id, semester)

Choose the correct relational algebra/TRC expression(s) to find the names of students who have enrolled in the 'Computer Science' department and are taking courses with more than 3 credits.

Options :

6406534157141. ✓ $\pi_{name}(\sigma_{dept='ComputerScience' \wedge credits > 3}(Student \bowtie Enrollment \bowtie Course))$

$\{t.name \mid \exists s \in Student, \exists e \in Enrollment, \exists c \in Course (s.student_id = e.student_id \wedge e.course_id = c.course_id \wedge c.dept = 'ComputerScience' \wedge$

6406534157142. ✓ $c.credits > 3 \wedge t.name = s.name\}$

6406534157143. ✖ $\pi_{name}(\sigma_{dept='ComputerScience' \wedge credits >= 3}(Student \times Enrollment \times Course))$

6406534157144. ✖ $\{t.name \mid \exists s \in Student, \exists e \in Enrollment, \exists c \in Course(c.dept = ' ComputerScience' \wedge c.credits > 3 \wedge t.name = s.name)\}$

Question Number : 210 Question Id : 6406531230312 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the following Entity Relationship Diagram:

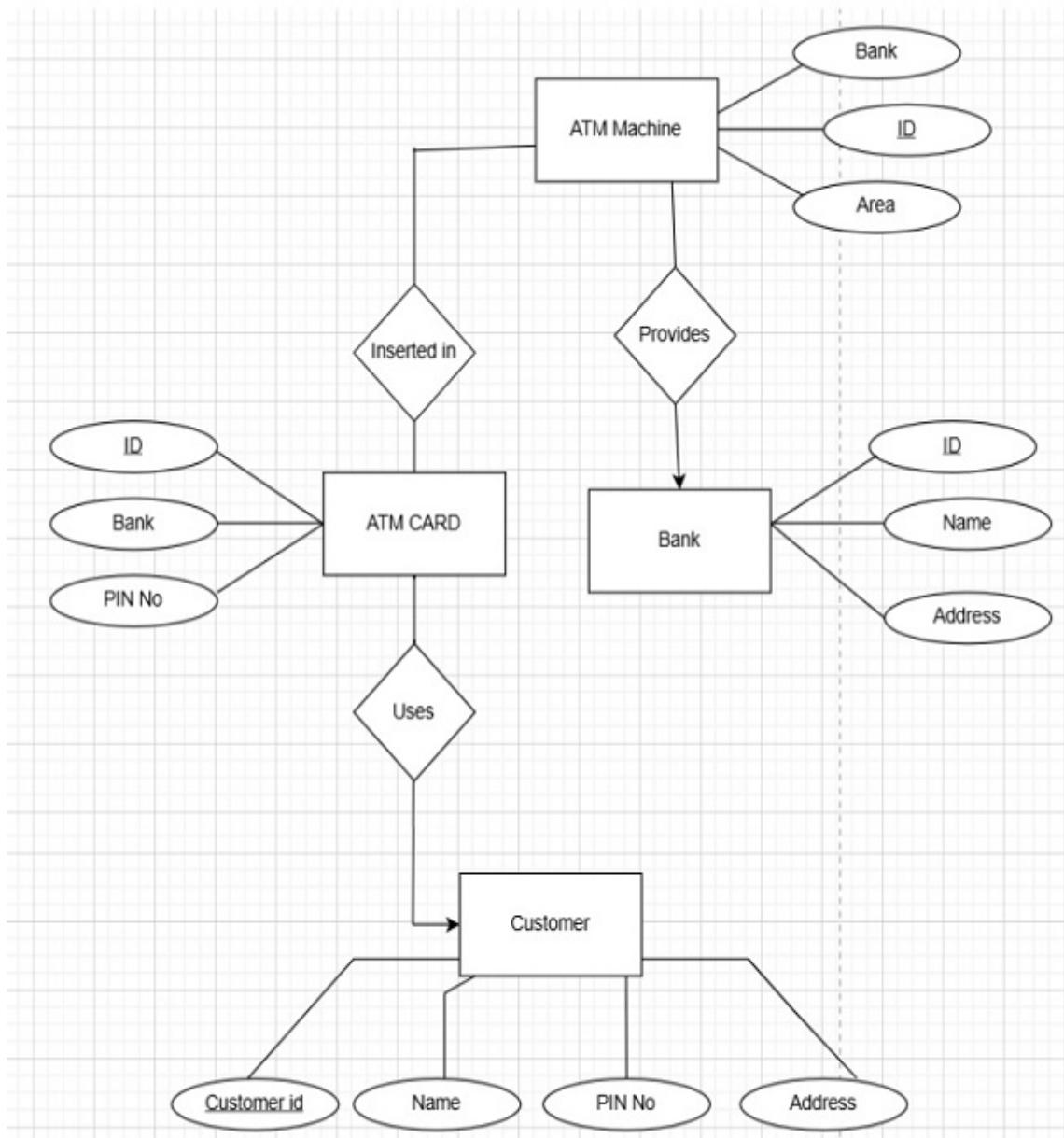


Figure 1: ER Diagram

Choose the correct statements.

Options :

6406534157145. ✓ A bank can provide more than one ATM machine

6406534157146. ✓ An ATM card is used by only one customer

6406534157147. ✗ A customer can use only one ATM card

6406534157148. ✓ An ATM card can be inserted in many ATM machines

Sub-Section Number : 6

Sub-Section Id : 640653189559

Question Shuffling Allowed : Yes

Question Number : 211 Question Id : 6406531230308 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Schedules S is as given:

S:W3(A), R2(A), W2(A), W3(B), W3(C), W1(C)

Which of the following options is/are correct?

Options :

6406534157129. ✓ Schedule S is conflict serializable.

6406534157130. ✓ Schedule S can be two-phase lockable.

6406534157131. ✓ Two phase lockable schedule are always serializable schedule.

6406534157132. ✗ Schedule S is not View Serializable

Sub-Section Number : 7

Sub-Section Id : 640653189560

Question Shuffling Allowed : Yes

Question Number : 212 Question Id : 6406531230313 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider you have a file in your hard disk of size 1000 KB. Seek time of your hard disk read head is 3ms and rotational speed in 30,000 rpm. The disk has 200 sectors per track and 512 bytes per sector. Considering the fact that the file data is stored in non consecutive sectors. How much time will be required to read the whole file after a read request is made? (in ms)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

24

Question Number : 213 Question Id : 6406531230314 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider a system using the Least Recently Used (LRU) page replacement policy. The system has a main memory buffer with 4 slots, and the page reference sequence is as follows:

3, 4, 1, 4, 2, 3, 1, 4, 2, 3

Calculate the total number of page misses (page faults) during this sequence.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

4

Question Number : 214 Question Id : 6406531230315 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider the given log records at an instance of time:

Table 5: Log records

< T_0 start >
< T_0 , A, 100, 200 >
< T_1 start >
< T_1 , B, 400, 300 >
< T_0 , C, 500, 600 >
< T_2 start >
< T_2 , D, 800, 700 >
< Commit T_0 >
< Checkpoint L >
< T_2 , C, 500, 1000 >
< T_1 , A, 100, 350 >
< Commit T_2 >
< T_1 , D, 800, 500 >

Suppose there is a system crash after the last log record. What will be the value of the expression $(B-A)+(C-D)$, based on the values stored on the disk at that point?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

500

Question Number : 215 Question Id : 6406531230316 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider the relation $R(A, B, C, D, E, F)$ and the following functional dependencies set

$$\mathcal{F} = \{C \rightarrow BD, D \rightarrow C, B \rightarrow A, E \rightarrow F\}$$

Find the total number of super keys of R .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

24

Question Number : 216 Question Id : 6406531230317 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider the following schedule S with five transactions T_1, T_2, T_3, T_4, T_5 :

$$S: R1(A); W3(A); W3(B); R5(B); R1(C); R4(A); W4(C); R5(D); W4(D)$$

Where, $R_i(A)$ denotes a read operation by transaction T_i on a data item A , $W_i(A)$ denotes a write operation by transaction T_i on a data item A .

What is the possible number of conflict serializable schedules of the above schedule S ?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

5

Question Number : 217 Question Id : 6406531230318 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider a Block nested loop join for the two relations, **instructor** and **department**. Assuming the worst-case memory availability and **instructor** as the outer relation, the provided details are as follows:

- Total number of block transfers: 10500
- Total number of seeks required: 500
- Number of block in the outer relation: 250

What is the number of blocks in the inner relations?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

41

Sub-Section Number : 8

Sub-Section Id : 640653189561

Question Shuffling Allowed : No

Question Id : 6406531230319 **Question Type :** COMPREHENSION **Sub Question Shuffling Allowed :** No **Group Comprehension Questions :** No **Question Pattern Type :** NonMatrix

Question Numbers : (218 to 219)

Question Label : Comprehension

Consider the SQL query to create a table **Insurance** and **Nominee** as shown below and answer the given subquestions

```
CREATE TABLE insurance (ins_id varchar(20) primary key,  
policyHolderName varchar(20) not null,  
age int not null, premium int not null )
```

```
CREATE TABLE nominee (nominee_id varchar(20) primary key,  
NomineeName varchar(20), relationship varchar(20), ins_id  
varchar(20), foreign key (ins_id) references  
insurance(ins_id) ON DELETE CASCADE)
```

The instance of the table **insurance** and **nominee** is as shown below:

ins_id	policyHolderName	age	premium
INS001	Ramesh	28	9800
INS002	Sumesh	29	8800
INS003	Suresh	33	12200

Table 6: insurance

nominee_id	NomineeName	relationship	ins_id
NM001	Shakti	Wife	INS001
NM002	Shyam	Son	INS001
NM003	Mukti	Wife	INS002
NM004	Yukti	Daughter	INS003

Table 7: nominee

Sub questions

Question Number : 218 Question Id : 6406531230320 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

The following SQL query is executed:

```
delete from insurance where ins_id = 'INS001'
```

What will be the value of x, if x represents the total number of rows in **insurance** and **nominee** table counted together?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

4

Question Number : 219 Question Id : 6406531230321 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

The following insert statements are executed in the given sequence in the same instance given as the previous question for insurance and nominee tables.

```
insert into insurance values ('INS004', 'Rakesh', 24, 7000);
insert into insurance values ('INS005', 'Sachin', 34, 10000);
insert into nominee values ('NM004', 'Sonu', 'Son', 'INS004');
insert into nominee values ('NM005', 'Suman', 'Wife', 'INS006');
insert into nominee values ('NM005', 'Monu', 'Son', 'INS004');
insert into nominee(nominee_id, ins_id) values ('NM010','INS005');
```

What will the output of the query below be?

```
SELECT * FROM nominee
```

Options :

nominee_id	NomineeName	relationship	ins_id
NM001	Shakti	Wife	INS001
NM002	Mukti	Wife	INS002
NM003	Yukti	Daughter	INS003

6406534157156. ✘

nominee_id	NomineeName	relationship	ins_id
NM001	Shakti	Wife	INS001
NM002	Mukti	Wife	INS002
NM003	Yukti	Daughter	INS003
NM004	Sonu	Son	INS005

6406534157157. ✘

nominee_id	NomineeName	relationship	ins_id
NM001	Shakti	Wife	INS001
NM002	Mukti	Wife	INS002
NM003	Yukti	Daughter	INS003
NM004	Sonu	Son	INS005
NM005	Monu	Son	INS004
NM010	NULL	NULL	INS005

6406534157158. ✓

nominee_id	NomineeName	relationship	ins_id
NM001	Shakti	Wife	INS001
NM002	Mukti	Wife	INS002
NM003	Yukti	Daughter	INS003
NM004	Sonu	Son	INS005
NM005	Suman	Wife	INS006
NM010	NULL	NULL	INS005

6406534157159. *

MLF

Section Id :	64065386899
Section Number :	10
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	13
Number of Questions to be attempted :	13
Section Marks :	40
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653189562
Question Shuffling Allowed :	No

Question Number : 220 Question Id : 6406531230322 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : MACHINE LEARNING FOUNDATIONS (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 :

6406534157160. ✓ YES

6406534157161. ✗ NO

Sub-Section Number :

2

Sub-Section Id :

640653189563

Question Shuffling Allowed :

Yes

Question Number : 221 Question Id : 6406531230323 Question Type : MCQ**Correct Marks : 3**

Question Label : Multiple Choice Question

Let X and Y have the joint pdf $f_{X,Y}(x,y) = \frac{xy}{4}$ for $0 \leq X \leq 2$ and $0 \leq Y \leq 2$.Define $U = X + Y$ and $V = X - Y$. What is the joint pdf of U and V ?**Options :**

$$f_{U,V}(u,v) = \begin{cases} \frac{u^2 - v^2}{32}, & \text{if } |v| \leq u \leq 4 - |v|, -2 \leq v \leq 2, \\ 0, & \text{otherwise.} \end{cases}$$

6406534157162. ✓

$$f_{U,V}(u,v) = \begin{cases} \frac{u^2 - v^2}{32}, & \text{if } 0 \leq u \leq 4, -2 \leq v \leq 2, \\ 0, & \text{otherwise.} \end{cases}$$

6406534157163. ✗

$$f_{U,V}(u,v) = \begin{cases} \frac{(u+v)(u-v)}{8}, & \text{if } 0 \leq u \leq 4, -4 \leq v \leq 4, \\ 0, & \text{otherwise.} \end{cases}$$

6406534157164. ✗

$$f_{U,V}(u,v) = \begin{cases} \frac{(u+v)(u-v)}{64}, & \text{if } |v| \leq u \leq 2 - |v|, -2 \leq v \leq 2, \\ 0, & \text{otherwise.} \end{cases}$$

6406534157165. ✗

Sub-Section Number :

3

Sub-Section Id :

640653189564

Question Shuffling Allowed :

Yes

Question Number : 222 Question Id : 6406531230324 Question Type : MSQ**Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following is true about the singular value decomposition (SVD)?

Options :

If A is an $m \times n$ matrix, the singular values of A are the square roots of the eigenvalues of $A^T A$.
6406534157166. ✓

6406534157167. ✓ The left singular vectors of A are the eigenvectors of AA^T .

6406534157168. ✓ The rank of the matrix A is equal to the number of its non-zero singular values.

6406534157169. ✗ For any square matrix A , SVD guarantees a unique decomposition.

Question Number : 223 Question Id : 6406531230325 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

In the context of Principal Component Analysis (PCA), which of the following statements is/are correct?

Options :

6406534157170. ✓ PCA projects the original data onto a lower-dimensional subspace that captures the maximum variance.

6406534157171. ✓ The eigenvectors of the covariance matrix correspond to the directions of maximum variance.

6406534157172. ✗ The principal components form a basis that is not necessarily orthogonal.

6406534157173. ✓ The principal components obtained through PCA are always uncorrelated.

Question Number : 224 Question Id : 6406531230327 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider a function $f(x) = x^4 - 4x^2 + 5$. Which of the following options is/are true?

Options :

6406534157178. ✗ $f(x)$ is a convex function.

6406534157179. ✗ $x = 0$ is a point of global maxima.

6406534157180. ✓ $x = \sqrt{2}$ is a point of global minima.

6406534157181. ✓ $x = -\sqrt{2}$ is a local minima.

Question Number : 225 Question Id : 6406531230328 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements about convex sets are true?

Options :

6406534157182. ✓ The set $X = \{(x_1, x_2, \dots, x_n) \mid \sum_{i=1}^n ax_i = b\}$ is a convex set.

6406534157183. ✓ Any line in \mathbb{R}^2 forms a convex set.

6406534157184. ✓ The intersection of two convex sets is a convex set.

6406534157185. ✗ Any curve in \mathbb{R}^2 forms a convex set.

Question Number : 226 Question Id : 6406531230329 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following options is / are true ?

Options :

6406534157186. ✓ $\ln x$ is not a convex function.

6406534157187. ✗ $\sin x$ is a convex function.

6406534157188. ✓ e^{x+2} is a convex function.

If f and g are both convex functions, then the compositions $f \circ g$ (i.e., $f(g(x))$)
6406534157189. ✗ and $g \circ f$ (i.e., $g(f(x))$) are also convex functions.

Sub-Section Number :

4

Sub-Section Id :

640653189565

Question Shuffling Allowed :

Yes

Question Number : 227 Question Id : 6406531230326 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

A company manufactures a commodity at two factories. The total cost of manufacturing depends on the quantities x and y supplied by each factory. The revised cost function is given by

$$f(x, y) = 3x^2 + 2xy + 4y^2 + 300$$

The company aims to produce 250 units while minimizing the production cost. Which of the following options is/are true?

Options :

6406534157174. ✓ The cost function $f(x, y)$ is convex.

6406534157175. ✓ The optimal solution satisfies $x + y = 250$.

6406534157176. ✗ The optimal production quantity from each factory occurs when $x = y$.

6406534157177. ✗ The minimum production cost is achieved when $x = 100$ and $y = 150$.

Sub-Section Number :

5

Sub-Section Id :

640653189566

Question Shuffling Allowed :

Yes

Question Number : 228 Question Id : 6406531230330 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Let X_1, X_2, X_3 be independent random variables with the following distributions:

- $X_1 \sim \text{Uniform}(0, 1)$
- $X_2 \sim \text{Poisson}(3)$
- $X_3 \sim \text{Exponential}(2)$

Find the expected value of the sum $S = X_1 + X_2 + X_3$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

4

Question Number : 229 Question Id : 6406531230332 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

A company records the number of defective products in a batch as a random variable X with $E[X] = 8$. Use Markov's inequality to find the upper bound on the probability that X is at least 16.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.5

Sub-Section Number : 6

Sub-Section Id : 640653189567

Question Shuffling Allowed : Yes

Question Number : 230 **Question Id :** 6406531230331 **Question Type :** SA

Correct Marks : 2

Question Label : Short Answer Question

Let X be a random variable uniformly distributed over the interval $[0, 4]$.

What is the value of the CDF (cumulative distribution function), $F_X(2)$? Enter the answer correct up to one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.5

Question Number : 231 **Question Id :** 6406531230333 **Question Type :** SA

Correct Marks : 2

Question Label : Short Answer Question

Consider the function

$$f(x, y) = x^2 + 3y^2 - 4x + 6y$$

We apply gradient descent with an initial point $(x_0, y_0) = (2, -1)$ and a learning rate of $\eta = 0.1$. Compute the updated values of x_1 and y_1 after one iteration of gradient descent, and enter the value of $x_1 + y_1$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Sub-Section Number : 7

Sub-Section Id : 640653189568

Question Shuffling Allowed : No

Question Id : 6406531230334 **Question Type :** COMPREHENSION **Sub Question Shuffling**

Allowed : No **Group Comprehension Questions :** No **Question Pattern Type :** NonMatrix

Question Numbers : (232 to 234)

Question Label : Comprehension

Consider an optimization problem

$$\min f(x, y, z, w) = x^2 + y^2 + z^2 + w^2 + 1$$

subject to constraints:

$$x + y + z + w = 1$$

$$w \leq \delta$$

Let the Lagrangian function is,

$$L(x, \alpha, \beta) = x^2 + y^2 + z^2 + w^2 + 1 + \alpha(1 - x - y - z - w) + \beta(w - \delta)$$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 232 **Question Id :** 6406531230335 **Question Type :** MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements correctly represents the Karush-Kuhn-Tucker (KKT) conditions for the given optimization problem?

Options :

6406534157194. ✓ $\nabla L = 0$

6406534157195. ✗ $\alpha \geq 0$

6406534157196. ✓ $\beta \geq 0$

6406534157197. ✗ $\beta(w - \delta) \leq 0$

Question Number : 233 Question Id : 6406531230336 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements are correct based on the KKT conditions and the solution to the optimization problem?

Options :

6406534157198. ✓ $x = y = \frac{\alpha}{2}$

6406534157199. ✗ $z = w = \alpha$

6406534157200. ✓ $\frac{3\beta}{8} \geq \frac{1}{4} - \delta$

6406534157201. ✗ $\frac{3\beta}{8} \leq \frac{1}{4} - \delta$

Question Number : 234 Question Id : 6406531230337 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

If $\delta > \frac{1}{4}$, then find the value of x .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.25

MLT

Section Id :

64065386900

Section Number :

11

Section type :

Online

Mandatory or Optional :

Mandatory

Number of Questions :

16

Number of Questions to be attempted :

16

Section Marks :

50

Display Number Panel :

Yes

Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653189569
Question Shuffling Allowed :	No

Question Number : 235 Question Id : 6406531230338 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : MACHINE LEARNING TECHNIQUES (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 :

6406534157203. ✓ YES

6406534157204. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 640653189570

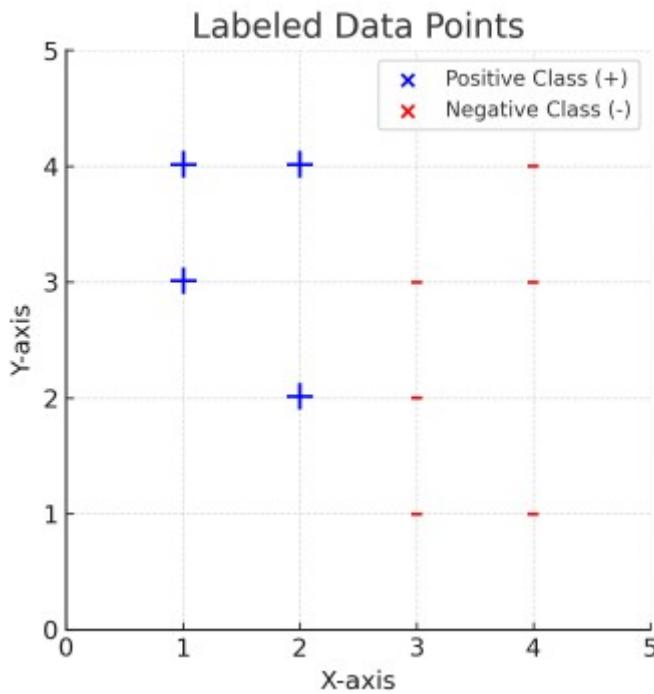
Question Shuffling Allowed : Yes

Question Number : 236 Question Id : 6406531230339 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

For a given dataset, a 1-Nearest Neighbor (1-NN) and a 3-Nearest Neighbor (3-NN) classifier are applied. Which classifier is likely to exhibit a higher Leave-One-Out Cross Validation (LOOCV) error? In case of tie-breaker, assign a positive class (+) to the data point.



Options :

6406534157205. ✓ 1-NN

6406534157206. ✗ 3-NN

6406534157207. ✗ Both have the same error.

Question Number : 237 Question Id : 6406531230340 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following three weight vectors obtained by minimizing the ridge regression objective with penalty parameters $\lambda = 0.1, 10, 50$.

$$\theta_1 = [0.5 \ 0.56 \ 2.5]^T$$

$$\theta_2 = [0.05 \ 0.1 \ 1.23]^T$$

$$\theta_3 = [1.2 \ 0.84 \ 3.15]^T$$

Select the most appropriate match for each weight vector corresponding to penalty parameter λ from the following options:

Options :

6406534157208. ✗ θ_1 corresponds to $\lambda = 50$, θ_2 to $\lambda = 0.1$, and θ_3 to $\lambda = 10$.

6406534157209. ✗ θ_1 corresponds to $\lambda = 0.1$, θ_2 to $\lambda = 10$, and θ_3 to $\lambda = 50$.

6406534157210. ✓ θ_1 corresponds to $\lambda = 10$, θ_2 to $\lambda = 50$, and θ_3 to $\lambda = 0.1$.

Sub-Section Number :

3

Sub-Section Id :

640653189571

Question Shuffling Allowed :

Yes

Question Number : 238 Question Id : 6406531230341 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the following dataset with two features and the corresponding labels:

x_1	x_2	y
1	0	1.5
2	2	4
3	0	4.5
4	2	7

Fit the linear regression model $y = w_1x_1 + w_2x_2$ using the normal equation obtained from the squared error loss.

Hint: The normal equation for linear regression is:

$$w = (XX^T)^{-1}Xy$$

Options :

6406534157211. ❌ $y = 2x_1 + x_2$

6406534157212. ✓ $y = 1.5x_1 + 0.5x_2$

6406534157213. ❌ $y = 1.8x_1 + 1.45x_2$

6406534157214. ❌ $y = x_1 + 2x_2$

Question Number : 239 Question Id : 6406531230342 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider a dataset with 4 datapoints:

$$\{(x_1, y_1), (x_2, y_2), (x_3, y_3), (x_4, y_4)\},$$

where $y_i \in \{+1, -1\}$ and $x_i \in \mathbb{R}^2$. In the first iteration of the AdaBoost algorithm, suppose a decision stump f_1 is chosen, which correctly classifies the first three data points and incorrectly classifies the last data point. Assume the initial distribution of the dataset assigns equal weights to all data points, i.e., $D_0(i) = \frac{1}{4}$, for $i = 1, 2, 3, 4$. What will be the updated distribution of the weights of the data points after the first iteration?

Options :

6406534157215. ❌

$$D_1(i) = \begin{cases} \frac{1}{3}, & i = 1, 2, 3 \\ 0, & i = 4 \end{cases}.$$

6406534157216. ✓ $D_1(i) = \begin{cases} \frac{1}{6}, & i = 1, 2, 3 \\ \frac{1}{2}, & i = 4 \end{cases}.$

6406534157217. ✗ $D_1(i) = \begin{cases} \frac{1}{4}, & i = 1, 2, 3, 4 \\ 0, & \text{otherwise} \end{cases}.$

6406534157218. ✗ $D_1(i) = \begin{cases} \frac{1}{5}, & i = 1, 2, 3 \\ \frac{2}{5}, & i = 4 \end{cases}.$

Sub-Section Number :

4

Sub-Section Id :

640653189572

Question Shuffling Allowed :

Yes

Question Number : 240 Question Id : 6406531230343 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements correctly differentiates PCA and Kernel PCA?

Options :

6406534157219. ✓ PCA maximizes variance in the original feature space, while Kernel PCA maximizes variance in a higher-dimensional transformed space.

6406534157220. ✓ PCA finds principal components using linear transformations in the original space, while Kernel PCA uses non-linear transformations to find principal components in a higher-dimensional space.

6406534157221. ✓ Kernel PCA can capture non-linear patterns in data, making it useful when PCA fails to represent complex structures in a linear space.

6406534157222. ✗ PCA and Kernel PCA always yield identical results regardless of the dataset structure.

Question Number : 241 Question Id : 6406531230344 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the following formulation of the soft margin SVM:

$$\min_{w, \epsilon} \frac{1}{2} \|w\|^2 + C \sum_{i=1}^n \epsilon_i, \quad C \geq 0$$

$$\text{subject to } (w^T x_i) y_i + \epsilon_i \geq 1, \quad \forall i \\ \epsilon_i \geq 0, \quad \forall i.$$

Which of the following statements is/are correct?

Options :

6406534157223. ✘ When $C = 0$, the optimal value of the objective function is ∞ .

6406534157224. ✓ When $C = 0$, the optimal value of the objective function is 0.

As C approaches 0, the soft-margin SVM is equivalent to the hard-margin

6406534157225. ✘ SVM.

As C approaches ∞ , the soft-margin SVM is equivalent to the hard-margin

6406534157226. ✓ SVM.

6406534157227. ✓ A smaller value of C will create larger margin.

Sub-Section Number :

5

Sub-Section Id :

640653189573

Question Shuffling Allowed :

Yes

Question Number : 242 Question Id : 6406531230345 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements are true for bagging?

Options :

6406534157228. ✓ The final model has lesser variance than the individual learners.

6406534157229. ✘ The final model has a higher variance than the individual learners.

6406534157230. ✓ Estimators in bagging can be trained parallelly.

6406534157231. ✘ If the number of data points is large, typically two-third of the data points remain unselected in bags.

Question Number : 243 Question Id : 6406531230346 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

What is the effect of increasing the regularization parameter λ in Lasso regression?

Options :

6406534157232. ✓ It penalizes large coefficients to reduce overfitting.

6406534157233. ✗ It shrinks the coefficients but does not set them to zero.

6406534157234. ✓ It forces more coefficients to be exactly zero, performing feature selection.

6406534157235. ✗ It has no effect on the regression model.

Sub-Section Number :

6

Sub-Section Id :

640653189574

Question Shuffling Allowed :

Yes

Question Number : 244 Question Id : 6406531230347 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

For a decision tree, each node has exactly two child nodes (balanced tree). If the tree has a depth of 3, how many leaf nodes are there?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

8

Sub-Section Number :

7

Sub-Section Id :

640653189575

Question Shuffling Allowed :

Yes

Question Number : 245 Question Id : 6406531230348 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider the following dataset in \mathbb{R}^2 :

$$\{(1, 2), (3, 4), (5, 4), (7, 8), (9, 10)\}$$

Lloyd's algorithm (K -means) is run on this data set with points $(1, 2)$ and $(9, 10)$ as the initial cluster centers. Let (c_1, d_1) and (c_2, d_2) be the final cluster centers upon convergence. What is the value of the product $c_1 \times c_2$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

24

Question Number : 246 Question Id : 6406531230349 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Let X_1, X_2, \dots, X_n be i.i.d. samples from a Uniform distribution on the interval $[0, \theta]$, where θ is an unknown parameter. The probability density function (PDF) of continuous uniform distribution is given by:

$$f(x; \theta) = \begin{cases} \frac{1}{\theta}, & 0 \leq x \leq \theta \\ 0, & \text{otherwise} \end{cases}$$

Find the Maximum Likelihood Estimate (MLE) of θ based on a given sample 10, 15, 12, 20, 17.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

20

Question Number : 247 Question Id : 6406531230350 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

You are building a Naïve Bayes classifier to determine whether a person has a certain medical condition (Yes or No) based on three features: f_1 (Age), f_2 (Blood pressure level), and f_3 (Smoking status, Yes/No). Given that the features are conditionally independent for a given class, the continuous features f_1 and f_2 are modeled using a Gaussian distribution, while the binary feature f_3 follows a Bernoulli distribution. Determine the total number of parameters that need to be estimated for classification using this Naïve Bayes model.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

11

Sub-Section Number :

8

Sub-Section Id :

640653189576

Question Shuffling Allowed :

No

Question Id : 6406531230351 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (248 to 249)

Question Label : Comprehension

Consider the following data set with three data points:

$$D = \left\{ \left(\begin{bmatrix} 1 \\ 1 \end{bmatrix}, -1 \right), \left(\begin{bmatrix} 1 \\ 0 \end{bmatrix}, +1 \right), \left(\begin{bmatrix} -1 \\ -1 \end{bmatrix}, +1 \right) \right\}.$$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 248 Question Id : 6406531230352 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Find the squared length of the updated weight vector after one iteration

(one pass through all the data points) of the perceptron algorithm, assuming

$w_0 = [0 \ 0]^T$. While looking for mistakes, cycle through the data points from left to right.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 249 Question Id : 6406531230353 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Will the algorithm converge after this update?

Options :

6406534157241. ✓ YES

6406534157242. ✗ NO

Question Id : 6406531230354 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (250 to 251)

Question Label : Comprehension

Consider the transformation $\phi : \mathbb{R}^2 \rightarrow \mathbb{R}^6$ associated with a polynomial kernel of degree 2:

$$\phi(x) = [1 \ x_1^2 \ x_2^2 \ \sqrt{2}x_1x_2 \ \sqrt{2}x_1 \ \sqrt{2}x_2]^T$$

A kernel-SVM is trained on a dataset with the above kernel. The optimal weight vector is $w = [-25 \ 1 \ 2 \ 0 \ 0 \ 0]^T$. Assume that the dataset is linearly separable in the transformed space.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 250 Question Id : 6406531230355 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

What is the shape of the decision boundary in \mathbb{R}^2 ?

Options :

6406534157243. ✘ It is a circle.

6406534157244. ✘ It is a straight line.

6406534157245. ✓ It is an ellipse.

6406534157246. ✘ It is a parabola.

Question Number : 251 Question Id : 6406531230356 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following training data points are certainly **not** support vectors?

Options :

6406534157247. ✓ $[1 \ 2]^T$

6406534157248. ✘ $[2\sqrt{2} \ 3]^T$

6406534157249. ✓ $[4 \ 2]^T$

6406534157250. ✘ $[3 \ 2\sqrt{2}]^T$

Question Id : 6406531230357 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (252 to 253)

Question Label : Comprehension

Consider a single-layer neural network with two neurons in the hidden layer.

The weight parameters of the network are given as follows:

$$w_1^{(1)} = \frac{1}{2}, \quad w_2^{(1)} = \frac{1}{2}$$

$$w_1^{(2)} = \frac{1}{2}, \quad w_2^{(2)} = -\frac{1}{2}$$

$$w^{out} = [1 \quad -1]^T,$$

where $w_i^{(j)}$ represents the weight associated with the j -th neuron for the i -th input feature. Assume that we are solving a binary classification problem.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 252 Question Id : 6406531230358 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

The output layer of the neural network will return a probability p for the input

$x_{test} = [2 \quad 4]^T$. The sigmoid function is used as the activation function in both the hidden and the output layer of the neural network.

Find the value of p . Enter the answer correct to two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.64 to 0.68

Question Number : 253 Question Id : 6406531230359 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

If the model predicts the label as **1** for p greater than 0.5 and **0** otherwise, find the predicted label for x_{test} .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Appdev1

Section Id :	64065386901
Section Number :	12
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	30
Number of Questions to be attempted :	30
Section Marks :	100
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653189577
Question Shuffling Allowed :	No

Question Number : 254 Question Id : 6406531230360 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : MODERN APPLICATION DEVELOPMENT 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 :

6406534157253. ✓ YES

6406534157254. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 640653189578

Question Shuffling Allowed : Yes

Question Number : 255 Question Id : 6406531230361 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

In a Flask application, we have a base template (`base.html`) that includes a `{% block content %}` section. A child template (`home.html`) extends this base template and uses `{{ super() }}` inside `{% block content %}`.

What will be the effect of using `{{ super() }}` inside the block in the child template?

Options :

6406534157255. ✗ It will result in an error because `super()` is not valid in Jinja2.

6406534157256. ✗ It will completely replace the content of `{% block content %}` in the base template.

6406534157257. ✓ It will include the content from the base template's `{% block content %}` along with the overridden content in the child template.

6406534157258. ✗ It will ignore the base template's content and only render the child template's content.

Question Number : 256 Question Id : 6406531230362 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Consider the following Python code snippet.

```
from jinja2 import Template

newlist = ['apple', 'banana', 'cherry', 'date', 'elderberry', 'fig']

this_template = """
    {% for item in data %}
        {% if item|length<6 %}
            {{ item }}
        {% endif %}
    {% endfor %}
"""

out = Template(this_template)

print(out.render(data=newlist))
```

What will be the output on the terminal?

Options :

6406534157259. ✘ appledatefig

6406534157260. ✓ apple date fig

6406534157261. ✘ banana cherry elderberry

6406534157262. ✘ bananacherryelderberry

Question Number : 257 Question Id : 6406531230363 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Consider the following git branches for a remote repository.

```
feature1  
* feature2  
main
```

Choose the correct git command sequence to merge **feature1** and **feature2** into the **main** branch.

Options :

git merge feature1
git merge feature2
git merge main

6406534157263. ✘

git checkout feature1
git merge feature2
git merge main

6406534157264. ✘

git checkout main
git merge feature1
git merge feature2

6406534157265. ✓

git merge main
git merge feature1
git merge feature3

6406534157266. ✘

Question Number : 258 Question Id : 6406531230364 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Match the Column-A with the Column-B.

Column-A		Column-B	
1	GET	a	Defines the view/layout of the web app
2	SQLAlchemy	b	Defines the model/table of the web app
3	Template	c	Method of HTTP request
4	SQLite	d	Object Relational Mapping

Options :

6406534157267. ❌ 1-c, 2-a, 3-d, 4-b

6406534157268. ❌ 1-d, 2-c, 3-a, 4-b

6406534157269. ❌ 1-c, 2-d, 3-b, 4-a

6406534157270. ✓ 1-c, 2-d, 3-a, 4-b

Sub-Section Number :

3

Sub-Section Id :

640653189579

Question Shuffling Allowed :

Yes

Question Number : 259 Question Id : 6406531230365 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following example:

```
<form>
  <label for="search-input">Search for a word:</label>
  <input
    type="text"
    id="search-input"
    placeholder="Type a word to search"
    aria-describedby="search-help"
    required
  />
  <small id="search-help">Enter a word to find relevant results.</small>
  <button type="submit">Start Search</button>
</form>
```

Which of the following accessibility principles is followed in this example?

Options :

6406534157271. ❌ Perceivable

6406534157272. ❌ Operable

6406534157273. ✓ Understandable

6406534157274. ✘ Robust

Question Number : 260 Question Id : 6406531230366 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

A Flask application and its absolute path is given below.

C:\home\mad_1>

app.py

```
from flask import Flask, url_for
import sys

def create_path():
    if len(sys.argv) < 2:
        return '/static'
    else:
        return f'/{sys.argv[1]}'

app = Flask(__name__, static_url_path = create_path())

@app.route('/home')
def display():
    return f"<h3>static url path: {app.static_url_path}</h3>\n      <h3>static folder: {app.static_folder}</h3>"

app.run(debug = True)
```

If the application is run locally on <http://127.0.0.1:5000> using the command python app.py stable, what will be rendered by the browser for URL <http://127.0.0.1:5000/home>?

Options :

static url path: C:\home\mad_1\static

6406534157275. ✘ static folder: /static

static url path: /static

6406534157276. ✘ static folder: C:\home\mad_1\static

static url path: /stable

6406534157277. ❌ **static folder: C:\home\mad_1\stable**

static url path: /stable

6406534157278. ✓ **static folder: C:\home\mad_1\static**

Question Number : 261 Question Id : 6406531230367 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following HTML code below.

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="UTF-8">
    <style>
      body{text-align: center;}
      p{font-size: 30px;color: black;}
      .blue{color: red;}
      .red{color: green !important;}
      .green{color: blue;}
      #myId{color: grey;}
    </style>
  </head>
  <body>
    <div>
      <p class="blue">Text1</p>
      <p class="red" id="myId">Text2</p>
      <p class="green" id="myId">Text3</p>
      <p class="green">Text4</p>
    </div>
  </body>
</html>
```

How will the browser render the above HTML file?

Match the rendered color for the text.

1. Text1	a. green
2. Text2	b. blue
3. Text3	c. red
4. Text4	d. grey

Options :

6406534157279. ✘ 1- b, 2 - a, 3- d, 4 - c

6406534157280. ✘ 1- c, 2 - d, 3- d, 4 - b

6406534157281. ✓ 1- c, 2 - a, 3- d, 4 - b

6406534157282. ✘ 1- a, 2 - c, 3- b, 4 - d

Question Number : 262 Question Id : 6406531230368 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

A Server S needs to retrieve data from two datacenters D1 and D2 located at 1500 kilometres and 3000 kilometres respectively. Server S and D1 are connected via medium M1 through which information can be transferred with the speed of 1.5×10^8 m/sec, and server S and D2 are connected via medium M2. If the server received data from both the data centres at the same time, what must be the speed of information transfer in medium M2(overheads should be ignored)?

(Concept: Performance parameters of a network)

Options :

6406534157283. ✘ 1.5×10^8 m/sec

6406534157284. ✘ 2×10^8 m/sec

6406534157285. ✘ 2.7×10^8 m/sec

6406534157286. ✓ 3×10^8 m/sec

Question Number : 263 Question Id : 6406531230369 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Let $L = \{ 'a', 'b', 'c', 'd', 'A', 'B', 'C', 'D', '^', '*', '#', '!', '$' \}$ be a complete character set (i.e., only these characters can be used to represent text in the document). If a document that uses fixed encoding with optimal number of bits for all characters is created using the character set L and has a disk size of 3 Kilobytes, the number of characters in the documents would be _____. [Take 1 Byte = 8 bits, 1 KB = 1000 Bytes, 1 MB = 1000 Kilobytes and so on.]

Options :

6406534157287. ✘ 3000

6406534157288. ✓ 6000

6406534157289. ✘ 9000

6406534157290. ✘ 12000

Question Number : 264 Question Id : 6406531230370 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

A mobile server and a client initially 1000 km apart are moving towards each other in a straight line with the speeds of 180 kmph and 70 kmph respectively. The network bandwidth is set constant to 3 Mbps. Determine how much data (in Gigabytes) is used by the client before the client and the server collide. [speed of light in vacuum: 3×10^8 m/sec, 1 MB = 1000 KB and so on.]

Options :

6406534157291. ✘ 64.8

6406534157292. ✘ 18

6406534157293. ✓ 5.4

6406534157294. ✘ 22.5

Question Number : 265 Question Id : 6406531230371 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following flask app. Given that `test_request_context()` allows text to be printed on the terminal, which of the following statements is correct?

```
from flask import Flask, url_for

app = Flask(__name__)

@app.route('/hello')
def hello():
    return 'Hello World!'

@app.route('/user/<username>')
def user(username):
    return f'Welcome {username}!'

with app.test_request_context():
    #== print statement ==#
```

Options :

6406534157295. ✘ If #== print statement ==# is replaced by `print(url_for('user', username='John'))`, the output on the terminal will be /user?username=John

6406534157296. ✘ If #== print statement ==# is replaced by `print(url_for('user', username='John', id='101'))`, the output on the terminal will be /user/John/101

6406534157297. ❌ If #== print statement ==# is replaced by print(url_for('hello', username='John')), the output on the terminal will be Hello World!

6406534157298. ✓ If #== print statement ==# is replaced by print(url_for('hello', username='John')),
the output on the terminal will be /hello?username=John.

Question Number : 266 Question Id : 6406531230372 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following Python code snippet.

```
from flask import Flask
from flask_restful import Api, Resource

app = Flask(__name__)
api = Api(app)

class MyApi(Resource):
    def get(self):
        return {"message": "Hello user!"}

    def put(self):
        return {"message": "Hello World!"}

api.add_resource(MyApi, '/api/get', '/api/put', '/api/post')

app.run()
```

If this application is running locally on http://127.0.0.1:5000, which of the following curl commands will throw an error?

1. curl http://127.0.0.1:5000/api/get -X get
2. curl http://127.0.0.1:5000/api/put -X put
3. curl http://127.0.0.1:5000/api/post -X post
4. curl http://127.0.0.1:5000/api/get -X put
5. curl http://127.0.0.1:5000/api/put -X get
6. curl http://127.0.0.1:5000/api/post -X get

Options :

6406534157299. ✓ Only 3
6406534157300. ✗ Only 3 and 4
6406534157301. ✗ Only 5 and 6
6406534157302. ✗ Only 3, 4, 5 and 6

Question Number : 267 Question Id : 6406531230373 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following HTML code .

File name: login.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>Login Page</title>
</head>
<body>
    <form action="/">
        <label for="uname">Username</label><br>
        <input type="text" name="uname" id="uname"><br>
        <label for="pwd">Password</label><br>
        <input type="password" name="pwd" id="pwd"><br>
        <input type="submit" value="Login">
    </form>
</body>
</html>
```

When the user clicks on the “Login” button the form data will be sent to the server using which HTTP method?

Options :

6406534157303. ✓ GET
6406534157304. ✗ POST
6406534157305. ✗ PUT
6406534157306. ✗ DELETE

Question Number : 268 Question Id : 6406531230374 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the code below in a file called test_students.py.

test_students.py

```
import pytest

@pytest.fixture
def students():
    return {"names": ["ravi", "raj"], "ages": [12, 9]}

@pytest.mark.check
def test_name(students):
    assert "ravi" in students['names']

@pytest.mark.check
def test_age(students):
    assert students['ages'][0] > 9

def test_check(students):
    assert "raj" not in students['names']
```

What will be the output on the terminal on running the command “pytest -m check”? (assume that the tests ran in 0.03s and that the markers have been registered)

Options :

6406534157307. ✓ ======2 passed, 1 deselected in 0.03s=====

6406534157308. ✘ ======2 passed in 0.03s=====

6406534157309. ✘ ======1 passed, 1 failed in 0.03s=====

6406534157310. ✘ ======2 passed, 1 failed in 0.03s=====

Question Number : 269 Question Id : 6406531230375 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following Python code.

File name: main.py

```
def funA(func):
    def inner_wrapper():
        print("Wrapper function of funA")
        res1 = func()
        res2 = func()
        return res1, res2

    return inner_wrapper

@funA
def funB():
    return "I am from funB"

print(funB())
```

What will be the output, when running the above code using the command “*python main.py*”?

Options :

6406534157311. ✘

Wrapper function of funA
('I am from funB', 'I am from funB')

6406534157312. ✓

Wrapper function of funA
('I am from funB', 'I am from funB')

6406534157313. ✘

Wrapper function of funA
I am from funB
I am from funB

6406534157314. ✘

I am from funB
I am from funB
Wrapper function of funA

Question Number : 270 Question Id : 6406531230376 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following Python code

File name: main_test.py

```
import pytest

class TestGroup:

    def do_something(self, x, y):
        return x % y

    def test_one(self):
        assert self.do_something(10, 5) == 0, " Is 5 factor of 10? "

    def test_two(self):
        assert self.do_something(32, 5) == 0, " Is 5 factor of 32 "
```

What will be the output of running the above python script using command line
“**pytest -v main_test.py**”?

Options :

6406534157315. ✓

```
===== short test summary info =====
FAILED main_test.py::TestGroup::test_two - AssertionError: Is 5
factor of 32
===== 1 failed, 1 passed in 0.12s =====
```

6406534157316. ✗

```
===== short test summary info =====
main_test.py::TestGroup::test_one PASSED [ 50%]
main_test.py::TestGroup::test_two PASSED [100%]
===== 2 passed in 0.02s =====
```

6406534157317. ✗

```
===== short test summary info =====
main_test.py::TestGroup::test_one FAILED [ 50%]
main_test.py::TestGroup::test_two FAILED [100%]
===== 2 failed in 0.02s =====
```

6406534157318. ✗

```
===== short test summary info =====
FAILED main_test.py::TestGroup::test_two - AssertionError: Is 5
factor of 10
FAILED main_test.py::TestGroup::test_two - AssertionError: Is 5
factor of 32
===== 2 failed in 0.12s =====
```

Sub-Section Number :

4

Sub-Section Id :

640653189580

Question Shuffling Allowed :

Yes

Question Number : 271 Question Id : 6406531230377 Question Type : MCQ

Correct Marks : 4.5

Question Label : Multiple Choice Question

Consider the following Jinja2 templating code:

```
from jinja2 import Template

template_str = """
{% set gifts = [
    {'name': 'Teddy Bear', 'price': 250, 'rating': 4.2},
    {'name': 'Coffee Mug', 'price': 150, 'rating': 4.5},
    {'name': 'Keychain', 'price': 100, 'rating': 3.9},
    {'name': 'Notebook', 'price': 180, 'rating': 4.7},
    {'name': 'Wall Clock', 'price': 300, 'rating': 4.0}
] %}

<ul>
    {% for gift in gifts if gift.price < 200 and gift.rating > 4 %}
        <li>{{ gift.name }} - {{ gift.price }} - {{ gift.rating }}</li>
    {% endfor %}
</ul>
"""

template = Template(template_str)
rendered_str = template.render()
print(rendered_str)
```

Will the above Jinja templating code return the correct output? If yes, what will be the result?

Options :

6406534157319. ✓

The template will work correctly, and the output will be:

```
<ul>
  <li>Coffee Mug - 150 - 4.5</li>
  <li>Notebook - 180 - 4.7</li>
</ul>
```

The template will not work correctly because the `for` loop condition (`if gift.price < 200 and gift.rating > 4`) is invalid in Jinja2 syntax. This will raise a `TemplateSyntaxError`.
6406534157320. ❌

The template will work correctly, but the output will include all gifts, not filtering by price and rating, as the condition inside the `for` loop will be ignored.
6406534157321. ❌

The template will work correctly, and the output will be:

```
<ul>
  <li>Teddy Bear - 250 - 4.2</li>
  <li>Wall Clock - 300 - 4.0</li>
</ul>
```

6406534157322. ❌

Question Number : 272 Question Id : 6406531230378 Question Type : MCQ

Correct Marks : 4.5

Question Label : Multiple Choice Question

You are given a project with three files: `conftest.py`, `test_multiples_of_3_and_6.py`, and `test_multiples_of_13.py`. The purpose of the tests is to verify if numbers generated by each function are divisible by 39. However, there is a setup issue in this project.

- `conftest.py` contains a fixture that provides test data.
- `test_multiples_of_3_and_6.py` has two functions: one checks divisibility by 3, and the other by 6.
- `test_multiples_of_13.py` contains a function to check divisibility by 13.

Here is the content of each file:

`conftest.py`

```
import pytest

@pytest.fixture
def divisible_by_39():
    return 39 # Fixture providing the number to be tested
```

`test_multiples_of_3_and_6.py`

```
import pytest

def test_divisible_by_3(divisible_by_39):
    assert divisible_by_39 % 3 == 0 # Checks if divisible by 3

def test_divisible_by_6(divisible_by_39):
    assert divisible_by_39 % 6 == 0 # Checks if divisible by 6
```

`test_multiples_of_13.py`

```
import pytest

def test_divisible_by_13(divisible_by_39):
    assert divisible_by_39 % 13 == 0 # Checks if divisible by 13
```

When you run `pytest -k divisible` , which of the following is true?

Options :

6406534157323. ✘ ===== 1 passed in 0.02s =====

6406534157324. ✘ ===== 3 passed in 0.02s =====

6406534157325. ✓ ===== 1 failed, 2 passed in 0.06s =====

6406534157326. ✘ ===== 3 errors in 0.02s =====

Question Number : 273 Question Id : 6406531230379 Question Type : MCQ

Correct Marks : 4.5

Question Label : Multiple Choice Question

A client machine and a server machine located 120 kilometers apart start moving towards each other along a straight line at 400 kmph and 800 kmph respectively. At the same time, the client starts sending requests to the server and the server sends back the response to the client. This client-server network continues to send requests and receive responses (with a new request being sent only after the response is received by the client for the previous one) until both the server and the client collide with each other. Calculate the total distance travelled (in kms) by the request data and the response data together before the two machines collide with each other?(assume the speed of request and response to be 3×10^8 m/s)

Options :

6406534157327. ✘ 54×10^6

6406534157328. ✘ 216×10^6

6406534157329. ✓ 108×10^6

6406534157330. ✘ 90×10^6

Question Number : 274 Question Id : 6406531230380 Question Type : MCQ

Correct Marks : 4.5

Question Label : Multiple Choice Question

Consider the following flask code.

```
from flask import Flask, redirect, url_for
app = Flask(__name__)

@app.route('/admin')
def hello_admin():
    return 'Hello Admin'

@app.route('/guest/<guest>')
def hello_guest(guest):
    return f'Hello {guest}'

@app.route('/user/<name>')
def hello_user(name):
    if name == 'admin':
        return redirect(url_for('hello_admin'))
    else:
        return redirect(url_for('hello_guest', guest=name))

if __name__ == '__main__':
    app.run(debug=True)
```

Match the commands in Column A with their correct rendered output in Column B

Column A	Column B
1. http://127.0.0.1:5000/user/admin	a. Hello mad1
2. http://127.0.0.1:5000/admin	b. Hello Admin
3. http://127.0.0.1:5000/guest/mad1	c. /admin
4. http://127.0.0.1:5000/user/mad1	d. /guest/mad1

Options :

6406534157331. ✘ 1-c, 2-b, 3-a, 4-d

6406534157332. ✘ 1-c, 2-d, 3-a, 4-b

6406534157333. ✘ 1-b, 2-a, 3-b, 4-d

6406534157334. ✓ 1-b, 2-b, 3-a, 4-a

Question Number : 275 Question Id : 6406531230381 Question Type : MCQ

Correct Marks : 4.5

Question Label : Multiple Choice Question

Consider a flask app "app.py" and a template file "doc.html" given below:

Python file: app.py

```
from flask import Flask, render_template

app = Flask(__name__)

itemlist = [
    {'value': '0', 'content': 'zero'},
    {'value': '1', 'content': 'one'},
    {'value': '2', 'content': 'two'},
    {'value': '3', 'content': 'three'},
]

@app.route('/')
def func():
    return render_template('doc.html', itemlist = itemlist)

app.run()
```

Template file: doc.html

```
<!DOCTYPE html>
<html lang="en">
<head><meta charset="UTF-8"></head>
<body>
    {% macro render_field(value='field value', content='content value') %}
        <option value="{{value}}">{{content}}</option>
    {% endmacro %}

    {% for item in itemlist %}
        {{ render_field(item.content) }}
    {% endfor %}
</body>
</html>
```

If the application is running locally on <http://127.0.0.1:5000>. What will be the raw HTML body of the file rendered by the flask app for base url?

Options :

```
<body>
    <option value="field value">zero</option>
    <option value="field value">one</option>
    <option value="field value">two</option>
    <option value="field value">three</option>
</body>
```

6406534157335. *

```
<body>
    <option value="zero">content value</option>
    <option value="one">content value</option>
    <option value="two">content value</option>
    <option value="three">content value</option>
</body>
```

6406534157336. ✓

```
<body>
    <option value="0">zero</option>
    <option value="1">one</option>
    <option value="2">two</option>
    <option value="3">three</option>
</body>
```

6406534157337. ✘

```
<body>
    <option value="zero">0</option>
    <option value="one">1</option>
    <option value="two">2</option>
    <option value="three">3</option>
</body>
```

6406534157338. ✘

Sub-Section Number :

5

Sub-Section Id :

640653189581

Question Shuffling Allowed :

Yes

Question Number : 276 Question Id : 6406531230382 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements about networking concepts (TCP, UDP, Proxy, Peer-to-Peer, Broadcast, Unicast, Multicast) are correct?

Options :

6406534157339. ✓ TCP is a connection-oriented protocol that ensures reliable data delivery.

6406534157340. ✓ UDP is a connectionless protocol that is faster but less reliable than TCP.

6406534157341. ✘ Proxy servers facilitate direct peer-to-peer connections between devices.

6406534157342. ✓ Broadcast sends a message to all devices in the network.

6406534157343. ✘ Unicast is a one-to-many communication model.

Question Number : 277 Question Id : 6406531230383 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the following route in the flask for a signup page and select the correct option:

```
@app.route('/signup', methods=['GET', 'POST'])
def signup():
    if request.method == 'GET':
        return """<form action='/signup' method='POST'>
            <label for='username'>Username</label>
            <input type='text' name='username' required>
            <label for='password'>Password</label>
            <input type='text' name='password' required minlength="8">
            <input type='submit' value='Submit'>
        </form>
    """

    if request.method == 'POST':
        if request.form.get('username') is None:
            return redirect(url_for(signup))
        if request.form.get('password') is None:
            return redirect(url_for(signup))
        if len(request.form.get('password')) < 8:
            return redirect(url_for(signup))
        return f"<h1>Welcome, {request.form.get('username')}!</h1>"
```

Options :

- 6406534157344. ✓ The signup page is dynamically generated.
- 6406534157345. ✓ The signup page uses server-side rendering.
- 6406534157346. ✓ The signup page uses frontend validation.
- 6406534157347. ✓ The signup page uses backend validation.

Question Number : 278 Question Id : 6406531230384 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

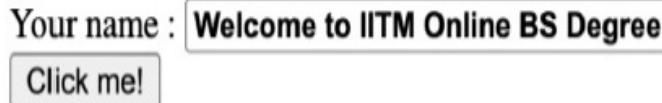
Question Label : Multiple Select Question

Consider the following HTML code.

File name: home.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>Home page</title>
    <script>
        //Missing JS code
    </script>
</head>
<body>
    <form>
        Your name : <input type="text" id="txt1" value="Welcome to IITM Online BS Degree" size="35">
        <br>
        <input type="button" onclick="doSomething()" value="Click me!">
    </form>
</body>
</html>
```

If the user clicks on the “**Click me!**” button, then which of the following JS codes should be added in the `<script>` tag that will bold the content of `<input>` tag as given in the image below?



Options :

```
function doSomething(){
    txt1=document.getElementById("txt1");
    txt1.style.fontWeight="bold";
}
```

6406534157348. ✓

```
function doSomething(){
    document.getElementById("txt1").style.fontWeight="bold";
}
```

6406534157349. ✓

```
function doSomething(){
    txt1=document.getElementById("txt1");
    txt1.style="bold";
}
```

6406534157350. ✘

6406534157351. ✘

```
function doSomething(){
    document.getElementById("txt1").style="bold";
}
```

Sub-Section Number : 6

Sub-Section Id : 640653189582

Question Shuffling Allowed : Yes

Question Number : 279 Question Id : 6406531230385 Question Type : MSQ

Correct Marks : 4.5 Max. Selectable Options : 0

Question Label : Multiple Select Question

The following Flask-RESTful API code snippet is intended to create a RESTful API for managing student registrations in an IITM BS degree program. However, there is an error in the code that prevents it from functioning correctly.

```
from flask import Flask, jsonify, request
from flask_restful import Api, Resource

app = Flask(__name__)
api = Api(app)

students = []

class Student(Resource):
    def get(self, student_id):
        for student in students:
            if student["id"] == student_id:
                return jsonify(student)
        return jsonify({"message": "Student not found"}), 404

    def post(self):
        data = request.get_json()
        new_student = {
            "id": data["id"],
            "name": data["name"]
        }
        students.append(new_student)
        return jsonify({"message": "Student added successfully"})

api.add_resource(Student, "/student/<int:student_id>")

if __name__ == "__main__":
    app.run(debug=True)
```

Error:

When trying to use the **POST** method to add a student, it throws a **TypeError** stating that the route does not match the method. Identify the correct option to fix the error in the code.

Options :

6406534157352. ✓ Change the `api.add_resource(Student, "/student/<int:student_id>")` to:
`api.add_resource(Student, "/student", "/student/<int:student_id>")`

6406534157353. ✓ Add the `student_id` parameter to the **post** method in the `Student` class as `def post(self, student_id):`

6406534157354. ❌

Replace the **post** method with the following route in the Student class:

```
def post(self):
    data = request.get_json()
    new_student = {
        "id": len(students) + 1,
        "name": data["name"]
    }
    students.append(new_student)
    return jsonify({"message": "Student added successfully"}), 201
```

Change the `api.add_resource(Student, "/student/<int:student_id>")` to:
`api.add_resource(Student, "/students")`

6406534157355. ❖

Question Number : 280 Question Id : 6406531230386 Question Type : MSQ

Correct Marks : 4.5 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the following Flask app code.

```
from flask import Flask, request
valid_users = [
    {"uid": "student", "pwd": "12345"},  
    {"uid": "professor", "pwd": "54321"},  
    {"uid": "hod", "pwd": "abcde"},  
]
app = Flask(__name__)

@app.route("/signin")
def login():
    args = request.args
    for vu in valid_users:
        if vu["uid"] == args["uid"] and vu["pwd"] == args["pwd"]:
            return "You are authorized!!"
    else:
        return "You are unauthorized!!"

app.run(debug=True)
```

Assume the above flask app runs on "<http://127.0.0.1:5000/>" and is accessed through the web browser. Select the URL(s) that render **Not Found** error.

Options :

6406534157356. ✘ <http://127.0.0.1:5000/signin?uid=professor&pwd=54321>

6406534157357. ✓ <http://127.0.0.1:5000/login?uid=professor&pwd=54321>

6406534157358. ✘ <http://127.0.0.1:5000/signin?uid=student&pwd=12345>

6406534157359. ✓ <http://127.0.0.1:5000/login?uid=student&pwd=12345>

6406534157360. ✘ <http://127.0.0.1:5000/signin?uid=hod&pwd=12345>

Sub-Section Number :

7

Sub-Section Id :

640653189583

Question Shuffling Allowed :

No

Question Id : 6406531230387 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (281 to 282)

Question Label : Comprehension

The students of IITM BS challenged their instructors to a cricket match.

A Flask web application is built to track the scores. Below is the **Flask** app code that defines multiple routes for fetching scores dynamically.

```
from flask import Flask

app = Flask(__name__)

@app.route('/')
def home():
    return "Welcome to the IITM BS Cricket Match Scoreboard!"

@app.route('/score/<team>')
def team_score(team):
    scores = {"students": 120, "instructors": 115}
    return f"{team.capitalize()} Score: {scores.get(team, 'Team not found')}"

@app.route('/score/<team>/<player>')
def player_score(team, player):
    players = {
        "students": {"Rahul": 45, "Ananya": 30, "Karthik": 25},
        "instructors": {"Prof.Prashant": 40, "Prof.Mayur": 35,
        "Dr.Subendu": 20}
    }
    return f"{player} ({team.capitalize()}) Scored: {players.get(team, {}).get(player, 'Player not found')}"

if __name__ == "__main__":
    app.run(debug=True)
```

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 281 Question Id : 6406531230388 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

What will be the output when the
following URL is accessed?

<http://127.0.0.1:5000/score/students>

Options :

6406534157361. ✓ Students Score: 120

6406534157362. ✗ students Score : 120

6406534157363. ✗ Team not found

6406534157364. ✗ Score: students

Question Number : 282 Question Id : 6406531230389 Question Type : MCQ

Correct Marks : 4.5

Question Label : Multiple Choice Question

What will happen if we access the
following URL?

<http://127.0.0.1:5000/score/instructors/Dr.Prashant>

Options :

6406534157365. ✗ Dr.Prashant (Instructors) Scored: 40

6406534157366. ✓ Dr.Prashant (Instructors) Scored: Player not found

6406534157367. ✗ Player not found

6406534157368. ✗ Internal Server Error

Sub-Section Number : 8

Sub-Section Id : 640653189584

Question Shuffling Allowed : No

Question Id : 6406531230390 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (283 to 284)

Question Label : Comprehension

A college counseling system is designed to store and retrieve student records efficiently. The system uses different types of storage based on latency, throughput, and density. During peak counseling sessions, thousands of students access their academic records, appointment schedules, and previous counseling notes. The system needs to optimize storage selection for different types of data:

1. Frequently accessed small data (e.g., currently active student records)
2. Large archives of past counseling records (rarely accessed but need long-term storage)
3. Temporary session data that needs to be quickly read and updated during counseling sessions

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 283 Question Id : 6406531230391 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Which of the following storage types should be used for storing **frequently accessed small student records** that need **low latency** and **high-speed access**?

Options :

6406534157369. ✘ Hard Disk Drive (HDD)

6406534157370. ✘ Solid State Drive (SSD)

6406534157371. ✓ Static RAM (SRAM)

6406534157372. ✘ Registers

Question Number : 284 Question Id : 6406531230392 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

The college wants to store **archived counseling records** from past students for future reference. These records are **rarely accessed**, but cost efficiency and storage density are important. Which storage type is best suited?

Options :

6406534157373. ✘ Registers

6406534157374. ✘ SRAM

6406534157375. ✘ DRAM

6406534157376. ✓ Hard Disk Drive (HDD)

Sub-Section Number :

9

Sub-Section Id :

640653189585

Question Shuffling Allowed :

No

Question Id : 6406531230393 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (285 to 286)

Question Label : Comprehension

Consider the following data models representing SQLite database tables and answer the given sub-questions.

```
class Student(db.Model):
    __tablename__ = "student"
    id=db.Column(db.Integer, primary_key=True)
    name=db.Column(db.String,not_null=False)
    tests=db.relationship('TestMarks',backref="student")

class TestMarks(db.Model):
    __tablename__ = "test_marks"
    id=db.Column(db.Integer, primary_key=True)
    test_name=db.Column(db.String,not_null=False)
    marks=db.Column(db.Integer,not_null=True)
    student_id=db.Column(db.Integer,db.ForeignKey('student.id'))
```

Sub questions

Question Number : 285 Question Id : 6406531230394 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements is/are True?

Options :

The marks of any student object,<student>
can be retrieved using the command

6406534157377. ✓ “<student>.tests”.

We cannot insert a new record into the
“test_marks” table for a non-existent
student object.

6406534157378. ✓

If a test marks record is deleted from the
“test_marks” table, the related student
record is also deleted from the “student”

6406534157379. ✗ table.

We can insert a new record in the “student”
table for a non-existent “test_marks” object.

6406534157380. ✓

Question Number : 286 Question Id : 6406531230395 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Which of the following is the correct way of adding records into the ‘student’ and the ‘test_marks’ tables?

Options :

```
>>>t1=TestMarks(id=1,test_name="quiz_1",marks=65,student_id=101)
>>>db.add(t1)
>>>db.commit()
>>>s1=Student(id=101,'RAM')
>>>db.add(s1)
>>>db.commit()
```

6406534157381. ✗

6406534157382. ✓

```
>>>s1=Student(id=101,name='RAM')
>>>db.add(s1)
>>>db.commit()
>>>t1=TestMarks(id=1,test_name="quiz_1",marks=65,student_id=101)
>>>db.add(t1)
>>>db.commit()
```

```
>>>t1=TestMarks(id=1,test_name="quiz_1",marks=65,student_id=101)
>>>s1=Student(id=101,name='RAM')
>>>db.add(t1)
>>>db.commit()
>>>db.add(s1)
>>>db.commit()
```

6406534157383. ✎

```
>>>t1=TestMarks(id=1,test_name="quiz_1",marks=65,student_id=101)
>>>s1=Student(id=101,'RAM')
>>>db.add(t1)
>>>db.add(s1)
>>>db.commit()
```

6406534157384. ✎

System commands

Section Id :	64065386902
Section Number :	13
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	17
Number of Questions to be attempted :	17
Section Marks :	100
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653189586

Question Shuffling Allowed :

No

Question Number : 287 Question Id : 6406531230396 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : SYSTEM COMMANDS (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 :

6406534157385. ✓ YES

6406534157386. ✗ NO

Sub-Section Number :

2

Sub-Section Id :

640653189587

Question Shuffling Allowed :

Yes

Question Number : 288 Question Id : 6406531230397 Question Type : MCQ

Correct Marks : 7

Question Label : Multiple Choice Question

What will be the output of the command

sort -n file1.txt file2.txt | awk '!seen[\$1]++ {print \$1, \$2, \$3}'

given the following content of file1.txt and file2.txt?

file1.txt

101 John Doe
103 Jane Smith
105 Emma Brown
107 William Harris
109 Oliver Lewis

file2.txt

102 Michael Johnson
103 Jane Smith
106 Lily Evans
107 William Harris
110 Sophia Turner

Options :

6406534157387. ✗

101 John Doe
103 Jane Smith
105 Emma Brown
107 William Harris
109 Oliver Lewis
102 Michael Johnson
103 Jane Smith
106 Lily Evans
107 William Harris
110 Sophia Turner

101 John Doe
102 Michael Johnson
103 Jane Smith
105 Emma Brown
106 Lily Evans
107 William Harris
109 Oliver Lewis
110 Sophia Turner

6406534157388. ✓

101 John Doe
102 Michael Johnson
103 Jane Smith
103 Jane Smith
105 Emma Brown
106 Lily Evans
107 William Harris
107 William Harris
109 Oliver Lewis

6406534157389. ✗

101 John Doe
103 Jane Smith
106 Lily Evans
107 William Harris
110 Sophia Turner
109 Oliver Lewis

6406534157390. ✗

Correct Marks : 7

Question Label : Multiple Choice Question

Schedule the script /home/user/backup.sh to meet the following requirements

1. The job should run at the 2nd minute of every hour, but only during weekdays (Monday to Friday).
2. Additionally, the job must not run during the first and last days of each month.
3. It should execute a script located at /home/user/backup.sh and log the output to /var/log/backup.log (append mode).

Which of the following exact **crontab** entry is used to schedule this job.

Options :

6406534157391. ❌ `2 * * * 1-5 ["$(date +\%d)" -gt1]&& ["$(date +\%d)" -lt 31] && /home/user/backup.sh >> /var/log/backup.log 2>&1`
6406534157392. ✓ `2 * * * 1-5 ["$(date +\%d)" -gt1]&& ["$(date +\%d)" -lt $(date -d "$(date +\%Y-%m-1) +1 month -1 day" +\%d)] && /home/user/backup.sh >> /var/log/backup.log 2>&1`
6406534157393. ❌ `2 * * 1-5 ["$(date +\%d)" -gt1]&& ["$(date +\%d)" -lt $(date -d "$(date +\%Y-%m-1) +1 month -1 day" +\%d)]&& /home/user/backup.sh > /var/log/backup.log`
6406534157394. ❌ `2 * * 1-5 ["$(date +\%d)" != "1"] && ["$(date +\%d)" != "31"] && /home/user/backup.sh >> /var/log/backup.log`

Question Number : 290 Question Id : 6406531230405 Question Type : MCQ

Correct Marks : 7

Question Label : Multiple Choice Question

```

#!/usr/bin/awk -f
{
    for (i = 1; i <= NF; i++) {
        word = tolower($i)
        gsub(/[^a-z]/, "", word)
        if (word != "")
            freq[word]++
    }
}

END {
    for (word in freq) {
        printf "%-15s %d\n", word, freq[word]
    }
}

```

What is the primary purpose of this AWK script?

Options :

- 6406534157419. ❌ To convert contents of file to lowercase.
- 6406534157420. ✓ To count the frequency of each word in a text file.
- 6406534157421. ❌ To count the number of lines in a file.
- 6406534157422. ❌ To replace all non-alphabetic characters in a file.

Question Number : 291 Question Id : 6406531230407 Question Type : MCQ

Correct Marks : 7

Question Label : Multiple Choice Question

What does the following script do

```
find /home -type f -name "*.log" -exec mv {} /sample/logs/ \;
```

Options :

- 6406534157427. ❌ Deletes all .log files in /home.
- 6406534157428. ❌ Lists all .log files in /sample/logs.
- 6406534157429. ✓ Finds all .log files and backs them up.
- 6406534157430. ❌ Renames .log files to .bak in /home.

Sub-Section Number :	3
Sub-Section Id :	640653189588
Question Shuffling Allowed :	Yes

Question Number : 292 Question Id : 6406531230399 Question Type : MCQ

Correct Marks : 6

Question Label : Multiple Choice Question

Select a single **sed** command to achieve the following.

- a) Find all lines that start with the word "error".
- b) Replace the word "error" with "warning" only on those lines.
- c) Append "- needs review" to the end of those same lines.

Options :

6406534157395. ✗ `sed '/error/s/^/warning/; /error/s/$/ needs review/' file.txt`

6406534157396. ✗ `sed '/^error/s/^[^]*/warning/; /^error/s/$/ needs review/' file.txt`

6406534157397. ✗ `sed '/^error/s/^error/warning/; /^warning/s/$/- needs review/' file.txt`

6406534157398. ✓ `sed '/^error/s/$/- needs review/; /^error/s/^error/warning/' file.txt`

Question Number : 293 Question Id : 6406531230400 Question Type : MCQ

Correct Marks : 6

Question Label : Multiple Choice Question

Consider current_permissions contain the present permissions of a file. Which of the following shell script statement calculate the new permissions by removing the read permission?

Options :

6406534157399. ✗ `new_permissions=$((current_permissions | ~0444))`

6406534157400. ✗ `new_permissions=$((current_permissions&0444))`

6406534157401. ✓ `new_permissions=$((current_permissions& ~0444))`

6406534157402. ✗ `new_permissions=$((current_permissions | 0444))`

Question Number : 294 Question Id : 6406531230401 Question Type : MCQ

Correct Marks : 6

Question Label : Multiple Choice Question

Select a command to find all established suspicious TCP connections on port 80 using netstat

Options :

6406534157403. ✗ `netstat -tuln | grep LISTEN`

6406534157404. ✓ `netstat -an | grep ':80' | grep ESTABLISHED`

6406534157405. ✘ netstat -r | grep ESTAB

6406534157406. ✘ netstat -r | grep LISTEN

Question Number : 295 Question Id : 6406531230402 Question Type : MCQ

Correct Marks : 6

Question Label : Multiple Choice Question

Which of the following vi command is used to replace the word 'apple' with 'orange' only in lines 10 to 20 of a file, and appear at the beginning or end of the line, without case sensitive and without user interaction.

Options :

6406534157407. ✘ :10,20s/^apple\|apple\$/ORANGE/ci

6406534157408. ✘ :10,20s/^apple|apple\$/ORANGE/gc

6406534157409. ✘ :s/^apple\|apple\$/orange/gci

6406534157410. ✓ :10,20s/^apple\c\|apple\$\c/orange/gi

Question Number : 296 Question Id : 6406531230403 Question Type : MCQ

Correct Marks : 6

Question Label : Multiple Choice Question

Which of the following regular expression matches any price of the form of \$3.45 or \$23.32 or \$400 in bash script

Options :

6406534157411. ✘ ^\\$[0-9]{2,}(\.[0-9]{2})?\$_

6406534157412. ✘ ^\\$[0-9]+\.[0-9]{3,}\$_

6406534157413. ✘ ^\\$[0-9]+\.[0-9]{0,2}\$_

6406534157414. ✓ ^\\$[0-9]+(\.[0-9]{2})?\$_

Question Number : 297 Question Id : 6406531230404 Question Type : MCQ

Correct Marks : 6

Question Label : Multiple Choice Question

What is the output of the following command
`file date | tee file1 file2 | diff file1 file2`

Options :

- 6406534157415. ✘ Display the today's date
- 6406534157416. ✓ Nothing is printed
- 6406534157417. ✘ list all the lines of file1 that do not match file2
- 6406534157418. ✘ 0

Question Number : 298 Question Id : 6406531230406 Question Type : MCQ

Correct Marks : 6

Question Label : Multiple Choice Question

What does the following sed script do?

```
sed 's/^\\([^\n]*\\),\\([^\n]*\\),\\(.*)\\/\\2,\\1,\\3/' file.csv
```

Options :

- 6406534157423. ✘ Deletes the first two fields in the CSV file.
- 6406534157424. ✓ Swaps the first and second fields of the CSV file.
- 6406534157425. ✘ Adds a new field to the CSV file.
- 6406534157426. ✘ Replaces all commas in the CSV file with spaces.

Question Number : 299 Question Id : 6406531230408 Question Type : MCQ

Correct Marks : 6

Question Label : Multiple Choice Question

What does the following shell command do?

```
tar --exclude='/remove/sample' -czvf backup.tar.gz /remove
```

Options :

- 6406534157431. ✓ Compresses the /remove directory into a tarball, excluding the /sample subdirectory, and names it backup.tar.gz.
- 6406534157432. ✘ Deletes the /sample subdirectory before creating a compressed tarball of /remove.
- 6406534157433. ✘ Extracts the contents of backup.tar.gz to /remove, excluding the /sample directory.
- 6406534157434. ✘ Lists the contents of /remove, ignoring the /sample subdirectory.

Question Number : 300 Question Id : 6406531230409 Question Type : MCQ

Correct Marks : 6

Question Label : Multiple Choice Question

You are working in a team with multiple developers using Git. One of your colleagues has created a feature branch from main, but over time, the main branch has received several commits. Your

colleague is now attempting to merge the feature branch into main, but a conflict arises in a file that was modified both in the main branch and in the feature branch.

How would you resolve the conflict, ensuring that the feature branch is up-to-date with the latest changes from main and that no work is lost? Additionally, how would you ensure that this situation is prevented in the future?

Options :

6406534157435. ✘ a. Merge the feature branch into main without updating main. Resolve conflicts directly in the merge commit.

b. Regularly merge main into the feature branch to avoid future conflicts.

6406534157436. ✘ a. Switch to the feature branch and run git pull origin feature-branch.

b. Resolve the conflict directly in main, then push the changes.

6406534157437. ✓ a. Ensure main is up-to-date by pulling the latest changes.

b. Switch to the feature branch and merge main into it.

c. Resolve the conflicts, commit the changes, and push the feature branch.

d. Merge the feature branch into main via a pull request.

e. Prevent future conflicts by encouraging regular updates between branches.

6406534157438. ✘ a. Merge the feature branch into main without resolving conflicts.

b. Use git reset to undo any conflicts and continue with the merge.

Sub-Section Number :

4

Sub-Section Id :

640653189589

Question Shuffling Allowed :

Yes

Question Number : 301 Question Id : 6406531230410 Question Type : MSQ

Correct Marks : 6 Max. Selectable Options : 0

Question Label : Multiple Select Question

There are 3 variable defined as

var1="Madras"

var2="IITM"

var3="NPTEL"

Which of the following options are correct to display the values of above three variables when the script is run in bash?

Options :

for i in {1..3}; do
 echo \\$var*i*

done

6406534157439. ✘

for i in {1..3}; do
 eval echo \\$var*i*

6406534157440. ✓ done

i=3

6406534157441. ✘ eval echo \${var{1..\$i}}

```
for i in {1..3}; do  
    echo var$i
```

6406534157442. ✘ done

6406534157443. ✓ echo \${var{1..3}}

Sub-Section Number :

5

Sub-Section Id :

640653189590

Question Shuffling Allowed :

Yes

Question Number : 302 Question Id : 6406531230411 Question Type : SA

Correct Marks : 6

Question Label : Short Answer Question

The value of the BASH_SUBSHELL after executing the following command

```
$ (ls;(date;(file * |echo $BASH_SUBSHELL)))
```

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

3

Question Number : 303 Question Id : 6406531230412 Question Type : SA

Correct Marks : 6

Question Label : Short Answer Question

What is the output of the following command

```
sh -c 'exit 405'; echo $?
```

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

149

Section Id :	64065386903
Section Number :	14
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	24
Number of Questions to be attempted :	24
Section Marks :	100
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653189591
Question Shuffling Allowed :	No

Question Number : 304 Question Id : 6406531230413 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : PROGRAMMING CONCEPTS USING JAVA (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 :

6406534157446. ✓ YES

6406534157447. ✗ NO

Sub-Section Number :	2
Sub-Section Id :	640653189592
Question Shuffling Allowed :	Yes

Question Number : 305 Question Id : 6406531230414 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the code given below.

```
class Shared {  
    static int count = 0;  
}  
  
class Adder extends Thread {  
    public void run() {  
        for(int i=0; i<1000; i++) {  
            Shared.count++;  
        }  
    }  
}  
  
public class Test {  
    public static void main(String[] args) throws InterruptedException {  
        Thread t1 = new Adder();  
        Thread t2 = new Adder();  
        t1.start();  
        t2.start();  
        t1.join();  
        t2.join();  
        System.out.print(Shared.count);  
    }  
}
```

Choose the correct option.

Options :

6406534157448. ✘ The code always prints 2000.
6406534157449. ✓ The code prints any number in the range 1000 to 2000
6406534157450. ✘ The code prints any number in the range 0 to 1000
6406534157451. ✘ The code always prints 1000.

Question Number : 306 Question Id : 6406531230415 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the following Java code that uses chained exceptions.

```
class FileStorageException extends Exception {  
    public FileStorageException(String message) {  
        super(message);  
    }  
}  
class FileUploadException extends Exception {  
    public FileUploadException(String message) {  
        super(message);  
    }  
}  
class FileService {  
    public void uploadFile(String filename) throws FileUploadException {  
        try {  
            // if(do not have enough disk space to store the file)  
            throw new FileStorageException("Insufficient disk space");  
            // else upload the file  
        } catch (FileStorageException e) {  
            FileUploadException fue = new FileUploadException("Failed to upload");  
            fue.initCause(e);  
            throw fue;  
        }  
    }  
}  
public class FileApp {  
    public static void main(String[] args) {  
        FileService fileService = new FileService();  
        try {  
            fileService.uploadFile("report.pdf");  
        } catch (FileUploadException e) {  
            System.out.println(e.getMessage());  
            System.out.println("Reason: " + e.getCause().getMessage());  
        }  
    }  
}
```

Which of these could be the output of this code?

Options :

6406534157452. ✓ Failed to upload
Reason: Insufficient disk space

6406534157453. ✗ Reason: Failed to upload
Insufficient disk space

6406534157454. ✗ Reason: Insufficient disk space

6406534157455. ✖ Reason: Failed to upload

Question Number : 307 Question Id : 6406531230416 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the two Java files given below.

Animal.java:

```
package creatures;
public class Animal {
    private String name;
    private String habitat;
    private int legs;
    // Constructor to initialize instance variables
    public String getName(String name) {
        return name;
    }
    protected String getHabitat(String habitat) {
        return habitat;
    }
    private int getLegs(int legs) {
        return legs;
    }
    public int showLegs(int legs) {
        return getLegs(legs);
    }
}
```

Test.java:

```
package Animals;
public class Test {
    public static void main(String[] args) {
        Animal myAnimal = new Animal();
        System.out.println("Number of legs: " + myAnimal.showLegs(4)); // LINE 1
        System.out.println(myAnimal.getHabitat("Forest")); // LINE 2
        System.out.println(myAnimal.getLegs(4)); // LINE 3
    }
}
```

Choose the correct option.

Options :

6406534157456. ❌ LINE 1 and LINE 2 generate compilation errors.

6406534157457. ✓ LINE 2 and LINE 3 generate compilation errors.

6406534157458. ❌ Only LINE 3 generates compilation error.

6406534157459. ❌ Only LINE 2 generates compilation error.

Question Number : 308 Question Id : 6406531230417 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the following Java code.

```
class CreditCard {  
    private double limit, balance, interestRate;  
    public CreditCard(double l, double b, double i) {  
        assert i > 0 : "Interest rate must be positive";  
        limit = l;  
        balance = b;  
        interestRate = i;  
    }  
    private boolean isValidTransaction(double amount) {  
        return (balance + amount <= limit);  
    }  
    public double processPayment(double amount) {  
        assert amount > 0 : "Payment must be positive";  
        assert isValidTransaction(amount) : "Transaction exceeds credit limit";  
  
        balance += amount;  
        return balance;  
    }  
}  
  
class CreditCardTest {  
    public static void main(String[] args) {  
        CreditCard card = new CreditCard(5000.00, 4000.00, 18.99);  
        System.out.println(card.processPayment(2000.00));  
    }  
}
```

Choose the correct option when the class is executed as:

java -ea CreditCardTest

Options :

6406534157460. ✘ This code generates output: 6000

6406534157461. ✘ This code generates Assertion Error: Payment must be positive

6406534157462. ✓ This code generates Assertion Error: Transaction exceeds credit limit

6406534157463. ✘ This code generates Assertion Error: Interest rate must be positive

Question Number : 309 Question Id : 6406531230418 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the Java code given below.

```
class Calculator {  
    public <T extends Number> void calculate(T value) { // LINE 1  
        System.out.println("Calculating: " + (value.doubleValue() * 2));  
    }  
    public <U extends Number> void calculate(U value) { // LINE 2  
        System.out.println("Double Calculation: " + (value.doubleValue() * 4));  
    }  
    public <T> void calculate(T value) { // LINE 3  
        System.out.println("Printing: " + value);  
    }  
}  
public class Test {  
    public static void main(String[] args) {  
        Calculator calc = new Calculator();  
        calc.calculate(5);  
        calc.calculate(2.1);  
        calc.calculate("Hello");  
    }  
}
```

Choose the correct option.

Options :

6406534157464. ✘ LINE 2 and LINE 3 generates a compilation error because method calculate() is already defined with the same signature.

6406534157465. ✘

LINE 1 and LINE 3 generates a compilation error because method calculate() is already defined with the same signature.

Only LINE 2 generates a compilation error because method calculate() is already defined with the same signature.
6406534157466. ✓

This program generates output:

Calculating: 10
Double Calculation: 8.4
Hello

6406534157467. ✗

Question Number : 310 Question Id : 6406531230419 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the Java code given below.

```
class Executive {  
    String name;  
    public Executive(String n) {  
        this.name = n;  
    }  
    public String toString() {  
        return "name = " + name;  
    }  
}  
class Director extends Executive {  
    int project_count;  
    public Director(String n, int p) {  
        super(n);  
        project_count = p;  
    }  
    public Director(Director d) {  
        super(d.name);  
        project_count = d.project_count;  
    }  
    public String toString() {  
        return super.toString() + ", project_count = " + project_count;  
    }  
}  
  
public class Corporation {  
    public static void main(String args[]) {  
        Executive d1 = new Director("Anjali", 5);  
        Executive d2 = new Director((Director) d1);  
        d2.name = "Rajesh";  
        System.out.println(d1 + "\n" + d2);  
    }  
}
```

What will the output be?

Options :

- name = Rajesh
- 6406534157468. ❌ name = Rajesh

- name = Rajesh, project_count = 5
- 6406534157469. ❌ name = Rajesh, project_count = 5

- name = Anjali, project_count = 5
- 6406534157470. ✓ name = Rajesh, project_count = 5

name = Anjali
6406534157471. ✘ name = Rajesh

Question Number : 311 Question Id : 6406531230420 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the Java code given below.

```
abstract class Vehicle {  
    abstract void start();  
    void fuel() { // LINE 1  
        System.out.println("Fueling vehicle");  
    }  
}  
  
class Car extends Vehicle {  
    void start() {  
        System.out.println("Starting car");  
    }  
    void fuel() {  
        System.out.println("Filling petrol in car");  
    }  
}  
  
class Bike extends Vehicle {  
    void start() {  
        System.out.println("Starting bike");  
    }  
    void fuel() {  
        System.out.println("Filling petrol in bike");  
    }  
}  
  
public class Test {  
    public static void main(String[] args) {  
        Vehicle v1 = new Car(); // LINE 2  
        Vehicle v2 = new Bike(); // LINE 3  
        v1.fuel();  
        v1.start();  
        v2.fuel();  
        v2.start();  
    }  
}
```

Choose the correct option.

Options :

LINE 1 generates compilation error because abstract class must contain only
6406534157472. ✘ abstract methods.

LINE 2 and LINE 3 generate compilation errors because a reference variable of type Vehicle cannot store the objects of type Car and Bike.

6406534157473. ✘

This program generates the output:

```
Filling petrol in car  
Starting car  
Filling petrol in bike  
Starting bike
```

6406534157474. ✓

This program generates the output:

```
Fueling vehicle  
Starting car  
Fueling vehicle  
Starting bike
```

6406534157475. ✘

Question Number : 312 Question Id : 6406531230421 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the Java code given below.

```
interface LightControl {  
    void turnOn(); //LINE 1  
    abstract void turnOff();  
}  
interface TemperatureControl {  
    abstract void setTemperature(int temp);  
}  
class SmartHome implements LightControl, TemperatureControl { //LINE 2  
    public void turnOn() {  
        System.out.println("Lights turned ON");  
    }  
  
    public void turnOff() {  
        System.out.println("Lights turned OFF");  
    }  
  
    public void setTemperature(int temp) {  
        System.out.println("Temperature set to " + temp + "°C");  
    }  
}  
public class Test {  
    public static void main(String[] args) {  
        LightControl home = new SmartHome();  
        home.turnOn();  
        home.turnOff();  
        home.setTemperature(22); //LINE 3  
    }  
}
```

What will the output be?

Options :

6406534157476. ✘ LINE 1 generates compilation error `turnOn()` is not declared as abstract

6406534157477. ✘ LINE 2 generates compilation error as a class cannot implement multiple interfaces

This program generates the output:

Lights turned ON
Lights turned OFF
Temperature set to 22°C

6406534157478. ✘

6406534157479. ✓ LINE 3 generates compilation error as `setTemperature()` method is not accessible

Question Number : 313 Question Id : 6406531230422 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the Java code given below.

```
import java.util.*;
public class Test {
    public static void main(String[] args) {
        Map<String, Integer> exam1 = new TreeMap<String, Integer>();
        exam1.put("Amit", 85);
        exam1.put("Neha", 78);
        exam1.put("Rahul", 90);
        exam1.put("Priya", 88);

        Map<String, Integer> exam2 = new TreeMap<String, Integer>();
        exam2.put("Amit", 80);
        exam2.put("Neha", 85);
        exam2.put("Rahul", 92);
        exam2.put("Priya", 86);

        Map<String, Integer> totalMarks = new TreeMap<String, Integer>();

        for (Map.Entry<String, Integer> e1 : exam1.entrySet())
            totalMarks.put(e1.getKey(), e1.getValue());

        for (Map.Entry<String, Integer> e2 : exam2.entrySet())
            totalMarks.merge(e2.getKey(), e2.getValue(), Integer::sum); // LINE 1

        System.out.println(totalMarks);
    }
}
```

Choose the correct option.

Options :

6406534157480. ❌ LINE 1 generates a compilation error because of an invalid key.

The program generates the output:

6406534157481. ✓ {Amit=165, Neha=163, Priya=174, Rahul=182}

The program generates the output:

{Amit=165, Neha=163, Rahul=182, Priya=174}

6406534157482. ❌

The program generates the output:

6406534157483. ✘ {Rahul=182, Priya=174, Neha=163, Amit=165}

Question Number : 314 Question Id : 6406531230423 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Method Stream.iterate(e, f) returns an infinite sequential ordered Stream produced by iterative application of a function f to an initial element e, producing a Stream consisting of e, f(e), f(f(e)), etc. Based on the above information, consider the code given below, and answer the question that follows.

```
import java.util.stream.Stream;
public class Test {
    public static void main(String[] args) {
        Stream.iterate(2, n -> n + 3)
            .map(n -> n * 2)
            .filter(n -> n % 5 == 0)
            .limit(3)
            .forEach((x) -> System.out.print(x + " "));
    }
}
```

What will the output be?

Options :

6406534157484. ✘ 4 10 16

6406534157485. ✓ 10 40 70

6406534157486. ✘ 5 20 35

6406534157487. ✘ 20 50 80

Question Number : 315 Question Id : 6406531230424 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the code given below.

```
class Rider implements Cloneable {  
    String name;  
    int[] distances;  
    public Rider(String n, int[] d) {  
        name = n;  
        distances = d;  
    }  
    public Object clone() throws CloneNotSupportedException {  
        return super.clone();  
    }  
}  
public class Test{  
    public static void main(String[] args) throws CloneNotSupportedException {  
        int[] d = {50, 60, 70};  
        Rider r1 = new Rider("Raj", d);  
        Rider r2 = (Rider) r1.clone();  
        Rider r3 = r1;  
        r2.distances[1] = 90;  
        r3.name = "Amit";  
  
        System.out.println(r1.name + " " + r1.distances[1]);  
        System.out.println(r2.name + " " + r2.distances[1]);  
        System.out.println(r3.name + " " + r3.distances[1]);  
    }  
}
```

What will the output be?

Options :

Amit 90

Raj 90

6406534157488. ✓ Amit 90

Amit 60

Raj 90

Amit 60

6406534157489. ✗ Amit 60

Raj 60

Raj 90

Amit 60

6406534157490. ✗ Amit 60

Raj 60

Raj 60

Amit 60

6406534157491. ✗ Amit 60

Question Number : 316 Question Id : 6406531230425 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Method `Optional.ofNullable(T value)` returns an `Optional` describing the specified value, if non-null, otherwise returns an empty `Optional`. Based on this description, consider the code given below, and answer the question that follows.

```
import java.util.*;
class GrindingMachine {
    String brand;
    String powerSource;
    public GrindingMachine(String b, String pS) {
        this.brand = b;
        this.powerSource = pS;
    }
}
public class Test {
    public static void main(String[] args) {
        var machineList = new ArrayList<GrindingMachine>();
        machineList.add(new GrindingMachine("Bosch", "Electric"));
        machineList.add(new GrindingMachine("Hitachi", null));
        for (GrindingMachine obj : machineList) {
            Optional<String> op1 = Optional.ofNullable(obj.powerSource);
            op1.ifPresent(source -> System.out.println(source));
        }
    }
}
```

Choose the correct option.

Options :

This program generates the output:

Electric

6406534157492. ❌ null

This program generates the output:

6406534157493. ✓ Electric

This program terminates abnormally due to `NullPointerException` without printing any value.

6406534157494. ❌

6406534157495. ❌

This program terminates abnormally due to `NullPointerException` after printing the value:

Electric

Question Number : 317 Question Id : 6406531230426 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the code given below.

```
import java.io.*;
class Laptop implements Serializable {
    private double price;
    private transient String model;
    private transient int serialNum;
    // Constructor to initialize instance variables
    public String toString() {
        return "price=" + price + ", model=" + model + ", serialNum=" + serialNum;
    }

    private void writeObject(ObjectOutputStream out) throws IOException {
        out.defaultWriteObject();
        out.writeInt(serialNum + 100);
    }

    private void readObject(ObjectInputStream in) throws Exception {
        in.defaultReadObject();
        serialNum = in.readInt() - 100;
    }
}

public class Test {
    public static void main(String[] args) throws Exception {
        var fos = new FileOutputStream("Laptop.txt");
        var oos = new ObjectOutputStream(fos);
        Laptop l1 = new Laptop(899.99, "Dell", 987654);
        oos.writeObject(l1);

        var fis = new FileInputStream("Laptop.txt");
        var ois = new ObjectInputStream(fis);
        Laptop obj = (Laptop) ois.readObject();
        System.out.println(obj);
    }
}
```

What will the output be?

Options :

6406534157496. ✘ price=899.99, model=Dell, serialNum=0

6406534157497. ✘ price=899.99, model=Dell, serialNum=987654

6406534157498. ✓ price=899.99, model=null, serialNum=987654

6406534157499. ✘ price=899.99, model=null, serialNum=0

Sub-Section Number :

3

Sub-Section Id :

640653189593

Question Shuffling Allowed :

Yes

Question Number : 318 Question Id : 6406531230427 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

Consider the Java code given below.

Assume the file “data.txt” already contains the following text:

Welcome to Java Programming

```
import java.io.*;
public class Test {
    public static void main(String[] args) {
        try {
            FileInputStream fis = new FileInputStream("data.txt");
            int i;
            while ((i = fis.read()) != -1) {
                if (i == 'a') {
                    System.out.print('*');
                } else {
                    System.out.print((char) i);
                }
            }
            fis.close();
        } catch (IOException e) {
            System.out.println("File not found!");
        }
    }
}
```

Choose the correct option regarding the output of the program:

Options :

6406534157500. ✓ Welcome to J*v* Progr*mming

6406534157501. ✖ Welcome to Java Programming

6406534157502. ✖ Welcome to J*va Programming

6406534157503. ✖ File not found!

Question Number : 319 Question Id : 6406531230428 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

Method `Collectors.partitioningBy(predicate)` returns a Collector which partitions the input elements according to a predicate, and organizes them into a `Map<Boolean, List<T>>`.

```
import java.util.*;
import java.util.stream.Collectors;
public class Test {
    public static void main(String[] args) {
        var numbers = new ArrayList<Integer>(); // LINE 1

        for (int i = 10; i <= 30; i += 5) {
            numbers.add(i);
        }

        Map<Boolean, List<Integer>> partitioned = numbers.stream()
            .collect(Collectors.partitioningBy(num -> num % 2 == 0));

        System.out.println("true -> " + partitioned.get(true));
        System.out.println("false -> " + partitioned.get(false));
    }
}
```

Choose the correct option.

Options :

This program generates the output:

true -> [10, 20, 30]

6406534157504. ✓ false -> [15, 25]

6406534157505. ✖

This program generates the output:

true -> [15, 25]

false -> [10, 20, 30]

This program generates compile time error at LINE 1 because the reference

6406534157506. ✖ type of list is not specified.

This program generates a runtime error due to incompatible stream elements.

6406534157507. ✖

Sub-Section Number :

4

Sub-Section Id :

640653189594

Question Shuffling Allowed :

Yes

Question Number : 320 Question Id : 6406531230429 Question Type : MCQ

Correct Marks : 6

Question Label : Multiple Choice Question

Consider the Java code given below.

```
import javax.swing.*;
import java.awt.*;
public class FeedbackForm extends JFrame {
    JPanel pnlName, pnlFeedback, pnlSubmit;
    JLabel lblName, lblFeedback;
    JTextField txtName;
    JTextArea txtFeedback;
    JButton btnSubmit;

    public FeedbackForm() {
        lblName = new JLabel("Name:");
        lblFeedback = new JLabel("Feedback:");
        txtName = new JTextField(15);
        txtFeedback = new JTextArea(5, 20);
        btnSubmit = new JButton("Submit");

        pnlName = new JPanel();
        //add lblName and txtName to pnlName
        pnlFeedback = new JPanel();
        //add lblFeedback and txtFeedback to pnlFeedback
        pnlSubmit = new JPanel();
        //add btnSubmit to pnlSubmit

        //CODE BLOCK

        setVisible(true);
        setSize(400, 300);
    }

    public static void main(String[] args) {
        new FeedbackForm();
    }
}
```

Choose the correct option to be filled in place of CODE BLOCK such that the above program produces the GUI given below.

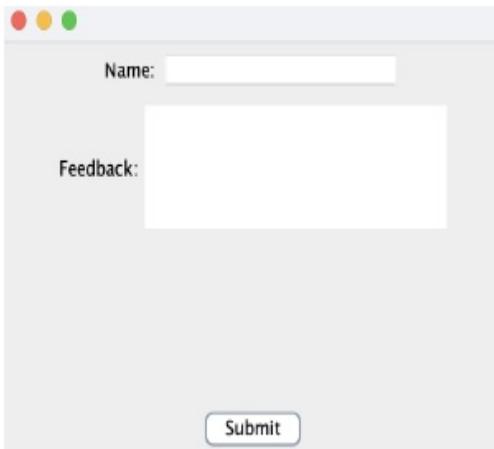


Figure 1: Feedback Form

Options :

6406534157508. ✘ add(pnlName, "Center");
add(pnlFeedback, "North");
add(pnlSubmit, "South");

6406534157509. ✘ add(pnlName, "North");
add(pnlFeedback, "South");
add(pnlSubmit, "Center");

6406534157510. ✓ add(pnlName, "North");
add(pnlFeedback, "Center");
add(pnlSubmit, "South");

6406534157511. ✘ add(pnlName, "South");
add(pnlFeedback, "Center");
add(pnlSubmit, "North");

Sub-Section Number :

5

Sub-Section Id :

640653189595

Question Shuffling Allowed :

Yes

Question Number : 321 Question Id : 6406531230430 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements is/are correct?

Options :

6406534157512. ✓ The heap stores dynamically allocated data.

6406534157513. ❌ Activation records created for functions are allocated on the heap.

6406534157514. ✓ The heap storage needs to be explicitly requested by the programmer.

6406534157515. ❌ Storage allocated on the heap cannot be deallocated in any way.

Question Number : 322 Question Id : 6406531230431 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the Java code given below.

```
import java.util.concurrent.ConcurrentHashMap;
class UpdaterThread extends Thread {
    private ConcurrentHashMap<String, Integer> map;
    public UpdaterThread(ConcurrentHashMap<String, Integer> m) {
        map = m;
    }
    public void run() {
        map.put("C", 3);
        map.put("D", 4);
    }
}
class IteratorThread extends Thread {
    private ConcurrentHashMap<String, Integer> map;
    public IteratorThread(ConcurrentHashMap<String, Integer> m) {
        map = m;
    }
    public void run() {
        for (String key : map.keySet()) {
            System.out.println(key + ": " + map.get(key));
        }
    }
}
public class Test {
    public static void main(String[] args) {
        ConcurrentHashMap<String, Integer> map = new ConcurrentHashMap<>();
        map.put("A", 1);
        map.put("B", 2);
        UpdaterThread updaterThread = new UpdaterThread(map);
        IteratorThread iteratorThread = new IteratorThread(map);
        updaterThread.start();
        iteratorThread.start();
        try {
            updaterThread.join();
            iteratorThread.join();
        } catch (InterruptedException e) {
            e.printStackTrace();
        }
        System.out.println("Final Map: " + map);
    }
}
```

Which of the following is/are true about the given code.

Options :

This program may generate the output:

- A: 1
- B: 2
- C: 3
- D: 4

Final Map: {A=1, B=2, C=3, D=4}

6406534157516. ✓

The program may generate the output:

- C: 3
- D: 4

Final Map: {A=1, B=2, C=3, D=4}

6406534157517. ✘

The program may generate the output:

- A: 1
- B: 2
- C: 3

6406534157518. ✓

Final Map: {A=1, B=2, C=3, D=4}

The program always generates the output:

- B: 2
- A: 1

Final Map: {A=1, B=2}

6406534157519. ✘

Question Number : 323 Question Id : 6406531230432 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the code given below.

```
class Library {  
    private boolean isBookAvailable = true;  
    public synchronized void borrowBook(String readerName) {  
        if (isBookAvailable) {  
            System.out.println(readerName + " borrowed the book.");  
            isBookAvailable = false;  
        } else {  
            System.out.println(readerName + " could not borrow the book.");  
        }  
    }  
}  
  
class Reader implements Runnable {  
    private Library library;  
    private String readerName;  
    public Reader(Library lib, String rn) {  
        this.library = lib;  
        this.readerName = rn;  
    }  
    public void run() {  
        library.borrowBook(readerName);  
    }  
}  
  
public class Test {  
    public static void main(String[] args) {  
        Library library = new Library();  
        Thread reader1 = new Thread(new Reader(library, "Rahul"));  
        Thread reader2 = new Thread(new Reader(library, "Ram"));  
        Thread reader3 = new Thread(new Reader(library, "Raghu"));  
        reader1.start();  
        reader2.start();  
        reader3.start();  
    }  
}
```

Which of the following options is/are possible result/s of the above code?

Options :

This code generates the output:

Rahul borrowed the book.

Raghu could not borrow the book.

Ram could not borrow the book.

6406534157520. ✓

6406534157521. ❌

This code generates the output:

Rahul borrowed the book.

Ram borrowed the book.

Raghu borrowed the book.

This code generates the output:

Raghu borrowed the book.

Rahul could not borrow the book.

Ram could not borrow the book.

6406534157522. ✓

This code generates the output:

Rahul borrowed the book.

Ram borrowed the book.

Raghu could not borrow the book.

6406534157523. ✘

Question Number : 324 Question Id : 6406531230433 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the Java code given below that processes Drawable objects. From among the options, identify the appropriate function header for function drawAll that takes as input a collection of Drawable objects and calls the draw method on each.

```
import java.util.*;
interface Drawable {
    void draw();
}
class Rectangle implements Drawable {
    // Constructor
    // method draw() that prints rectangle details
}
class Triangle implements Drawable {
    // Constructor
    // method draw() that prints triangle details
}
public class Canvas {
    // LINE 1: FUNCTION HEADER
    {
        // invokes draw() on each element
    }
    public static void main(String[] args) {
        Set<Drawable> shapes = new HashSet<>();
        shapes.add(new Rectangle(4, 5));
        shapes.add(new Triangle(3, 4, 5));
        drawAll(shapes);
    }
}
```

Choose the correct option(s).

Options :

6406534157524. ❌ public static void drawAll(Collection<?> elements)

6406534157525. ❌ public static <T> void drawAll(Collection<T> elements)

6406534157526. ✓ public static <T extends Drawable> void drawAll(Collection<T> elements)

6406534157527. ✓ public static void drawAll(Set<Drawable> elements)

Question Number : 325 Question Id : 6406531230434 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the code given below.

```
class Person {  
    public void work() {  
        System.out.println("works as a person.");  
    }  
}  
class Teacher extends Person {  
    public void work() {  
        System.out.println("Works as teacher.");  
    }  
    public void grade() {  
        System.out.println("Grading papers.");  
    }  
}  
class MathTeacher extends Teacher {  
    public void solveEquation() {  
        System.out.println("Solving complex equations.");  
    }  
}  
public class SchoolTest {  
    public static void main(String[] args) {  
        Person p = new MathTeacher(); // LINE 1  
        p.work();  
        p.grade(); // LINE 2  
        p.solveEquation(); // LINE 3  
    }  
}
```

Choose the correct option(s).

Options :

This program generates the output:

Works as teacher.

Grading papers.

6406534157528. ✘ Solving complex equations.

LINE 1 generates a compilation error because a variable of type Person cannot

6406534157529. ✘ refer to an object of type MathTeacher.

LINE 2 generates a compilation error because the method grade() is not defined in the Person class.

6406534157530. ✓

6406534157531. ✓

LINE 3 generates a compilation error because the method `solveEquation()` is not defined in the `Person` class.

Sub-Section Number : 6
Sub-Section Id : 640653189596
Question Shuffling Allowed : Yes

Question Number : 326 Question Id : 6406531230435 Question Type : MSQ

Correct Marks : 6 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the following Java code.

```
1. class Animal {  
2.     protected final void makeSound() {  
3.         System.out.println("Animal makes sound");  
4.     }  
5. }  
6. class Bird {  
7.     public void fly() {  
8.         System.out.println("Bird flies");  
9.     }  
10. }  
11. class Parrot extends Animal, Bird {  
12.     public void makeSound() {  
13.         System.out.println("Parrot squawks");  
14.     }  
15. }  
16. public class TestProgram {  
17.     public static void main(String[] args) {  
18.         Parrot p1 = new Animal();  
19.     }  
20. }
```

Identify the line/s which has/have errors.

Options :

6406534157532. ✘ Line 2

6406534157533. ✘ Line 7

6406534157534. ✓ Line 11

6406534157535. ✓ Line 12

6406534157536. ✓ Line 18

Question Number : 327 Question Id : 6406531230436 Question Type : MSQ

Correct Marks : 6 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the Java code given below.

```
import java.awt.*;
import javax.swing.*;
import java.awt.event.*;

class OrderDemo extends JFrame implements ActionListener {
    JButton btnOrder, btnCancel;
    JLabel label;
    JPanel p1, p2;

    public OrderDemo() {
        p1 = new JPanel();
        p2 = new JPanel();

        btnOrder = new JButton("Order");
        btnCancel = new JButton("Cancel Order");
        label = new JLabel("Select an option");

        p1.add(btnOrder);
        p1.add(btnCancel);
        p2.add(label);

        add(p1, "Center");
        add(p2, "South");

        btnOrder.setActionCommand("Order");
        btnCancel.setActionCommand("Cancel");
        btnOrder.addActionListener(this);
        btnCancel.addActionListener(this);

        setSize(350, 150);
        setVisible(true);
    }

    public void actionPerformed(ActionEvent e) {
        // CODE SEGMENT
    }
}

public class OrderTest {
    public static void main(String[] args) {
        new OrderDemo();
    }
}
```

Choose the correct code segment to be filled inside the method actionPerformed() such that on clicking the Order button, the label text changes to Order placed successfully, and on clicking the Cancel Order button, the label text changes to Order canceled.



Options :

6406534157537. ✓

```
if (e.getActionCommand().equals("Order"))
    label.setText("Order placed successfully");
else if (e.getActionCommand().equals("Cancel"))
    label.setText("Order canceled");
```

6406534157538. ✘

```
if (e.getSource().equals("Order"))
    label.setText("Order placed successfully");
else if (e.getSource().equals("Cancel"))
    label.setText("Order canceled");
```

6406534157539. ✓

```
if (e.getSource().equals(btnOrder))
    label.setText("Order placed successfully");
else if (e.getSource().equals(btnCancel))
    label.setText("Order canceled");
```

6406534157540. ✘

```
if (e.getActionCommand().equals(Order))
    label.setText("Order placed successfully");
else if (e.getActionCommand().equals(Cancel))
    label.setText("Order canceled");
```

TDS

Section Id :	64065386904
Section Number :	15
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	17
Number of Questions to be attempted :	17

Section Marks :	40
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653189597
Question Shuffling Allowed :	No

Question Number : 328 Question Id : 6406531230437 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : TOOLS IN DATA SCIENCE (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 :

6406534157541. ✓ YES

6406534157542. ✗ NO

Sub-Section Number :	2
Sub-Section Id :	640653189598
Question Shuffling Allowed :	Yes

Question Number : 329 Question Id : 6406531230438 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

You receive a tab-delimited file where some numeric fields are interpreted as dates (e.g., "3/10" becomes "March 10" in Excel). What is the most effective way to handle this in Text to-Columns?

Options :

6406534157543. ✗ Change the delimiter to commas before opening the file

6406534157544. ✓ Format the column as Text before applying Text-to-Columns

6406534157545. ✗ Use the General data format option in Text-to-Columns

6406534157546. ✗ Manually change the affected cells back to numbers after splitting

Question Number : 330 Question Id : 6406531230440 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

In Python, which statement correctly handles exceptions and ensures that cleanup code is executed?

Options :

6406534157551. ✘ `try-except`

6406534157552. ✓ `try-except-finally`

6406534157553. ✘ `if-else-finally`

6406534157554. ✘ `try-catch-finally`

Question Number : 331 Question Id : 6406531230441 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

A research team has a pandas dataframe of medical trial participants. To quickly identify how many different treatment groups exist, which Pandas method would be most efficient?

Options :

6406534157555. ✘ ``len(set(column))``

6406534157556. ✘ ``column.count()``

6406534157557. ✓ ``column.nunique()``

6406534157558. ✘ ``column.value_counts()``

Question Number : 332 Question Id : 6406531230442 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

In Git, what is the purpose of the `.gitignore` file?

Options :

6406534157559. ✘ To track changes to specific files

6406534157560. ✓ To specify files that Git should not track

6406534157561. ✘ To define Git repository settings

6406534157562. ✘ To list contributors to the repository

Question Number : 333 Question Id : 6406531230443 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

A developer wants to examine API request headers and responses to debug an issue with a failing API call. Where in Chrome DevTools should they look?

Options :

6406534157563. ❌ Console tab

6406534157564. ❌ Application tab

6406534157565. ✓ Network tab

6406534157566. ❌ Sources tab

Question Number : 334 Question Id : 6406531230445 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

A pharmaceutical researcher is testing a new drug's effectiveness. If the p-value is 0.03 in a regression analysis, what can be concluded about the drug's impact?

Options :

6406534157571. ❌ The drug has no significant effect

6406534157572. ✓ The result is statistically significant at a 5% significance level

6406534157573. ❌ More data collection is needed

6406534157574. ❌ The sample size is too small

Question Number : 335 Question Id : 6406531230446 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

A data analyst receives a messy dataset with inconsistent company names like "Apple", "Apple Inc.", and "Apple Incorporated". Which tool would best standardize these entries?

Options :

6406534157575. ❌ Excel's Find and Replace

6406534157576. ✓ OpenRefine's clustering feature

6406534157577. ❌ Python's string manipulation

6406534157578. ❌ Manual editing

Question Number : 336 Question Id : 6406531230447 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

A web developer wants to analyze the load time and resources of a webpage. Which Chrome DevTools feature provides comprehensive network request information?

Options :

6406534157579. ❌ Console tab

6406534157580. ✓ Network tab

6406534157581. ❌ Elements tab

6406534157582. ❌ Sources tab

Question Number : 337 Question Id : 6406531230448 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Which of the following is NOT a feature typically found in modern IDEs?

Options :

6406534157583. ❌ Syntax highlighting

6406534157584. ❌ Integrated debugger

6406534157585. ❌ Version control integration

6406534157586. ✓ Native hardware virtualization

Question Number : 338 Question Id : 6406531230449 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Which of the following describes the primary use of Kumu?

Options :

6406534157587. ❌ Building financial models

6406534157588. ✓ Creating system maps and visualizing relationships

6406534157589. ❌ Performing real-time data analysis

6406534157590. ❌ Designing geographic maps for navigation

Sub-Section Number : 3

Sub-Section Id : 640653189599

Question Shuffling Allowed : Yes

Question Number : 339 Question Id : 6406531230439 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Which HTTP method is idempotent, meaning multiple identical requests have the same effect as a single request?

Options :

6406534157547. ❌ POST

6406534157548. ✓ PUT

6406534157549. ❌ GET

6406534157550. ❌ DELETE

Sub-Section Number : 4

Sub-Section Id : 640653189600

Question Shuffling Allowed : Yes

Question Number : 340 Question Id : 6406531230444 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

A researcher needs to perform spatial data operations like buffering and visualize the results on an interactive map. Which libraries would be most suitable?

Options :

6406534157567. ✓ Geopandas

6406534157568. ✓ Folium

6406534157569. ✗ Matplotlib

6406534157570. ✗ Shapely

Sub-Section Number :

5

Sub-Section Id :

640653189601

Question Shuffling Allowed :

No

Question Id : 6406531230450 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (341 to 343)

Question Label : Comprehension

Scenario 1:

Sarah is working on a research paper about renewable energy technologies and decides to use an LLM to help her draft some sections.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 341 Question Id : 6406531230451 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Sarah prompts the LLM: "Write a comprehensive overview of solar energy advancements in the last decade."

The instructor wants to ensure that the LLM provides concise, clear, and helpful answers. What is the role of the system prompt in guiding the LLM's behavior?

Options :

6406534157591. ✓ It defines the LLM's tone, behavior, and response style to align with the instructor's teaching goals.

6406534157592. ✗ It provides a list of pre-written responses to be used in all classroom scenarios.

6406534157593. ✗ It prevents the LLM from ever deviating from pre-determined responses, regardless of the context.

6406534157594. ✗ It configures the LLM to only respond to specific commands, disregarding any other input.

Question Number : 342 Question Id : 6406531230452 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

When Sarah submits increasingly complex prompts about solar energy, which of the following statements are TRUE regarding LLM cost and usage

Options :

6406534157595. ✓ LLM costs are primarily calculated based on the number of tokens processed

6406534157596. ✗ LLM usage is always free for academic research

6406534157597. ✓ The total length of both input prompt and output response impacts the overall cost

6406534157598. ✗ LLM costs are fixed regardless of the complexity of the query

6406534157599. ✗ Token count has no relation to computational resources required

Question Number : 343 Question Id : 6406531230453 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Sarah wants to improve the specificity of her LLM prompt. Which prompt is likely to generate the most precise and useful response?

Options :

6406534157600. ✗ "Tell me about solar energy"

6406534157601. ✗ "Discuss solar energy advancements"

6406534157602. ✓ "Outline 4 key solar energy technological breakthroughs from 2014-2024, including specific efficiency improvements and implementation challenges"

6406534157603. ✗ "Write a paragraph about solar energy"

Sub-Section Number :

6

Sub-Section Id :

640653189602

Question Shuffling Allowed :

No

Question Id : 6406531230454 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (344 to 348)

Question Label : Comprehension

Scenario 2

Wildfire Emergency Evacuation Planning

Background:

A wildfire is threatening a rural mountain region, and emergency services need to coordinate evacuation routes for four remote communities. The Emergency Management Center is located at a central command post, and must plan the most efficient evacuation route to ensure rapid and safe community evacuation.

The four communities are:

Pine Ridge Settlement (Latitude: 38.7456, Longitude: -120.8765)
Mountain View Village (Latitude: 38.6987, Longitude: -120.9234)
River Valley Community (Latitude: 38.7123, Longitude: -120.7654)
Forest Creek Hamlet (Latitude: 38.6789, Longitude: -120.8901)

Central Command Post Location:
(Latitude: 38.7200, Longitude: -120.8500)

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 344 Question Id : 6406531230455 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

During the wildfire emergency, multiple teams are updating evacuation plans. Which Git command would a team member use to get the latest evacuation route updates?

Options :

6406534157604. ✘ git commit

6406534157605. ✘ git checkout

6406534157606. ✓ git pull

6406534157607. ✘ git add

Question Number : 345 Question Id : 6406531230456 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

An emergency responder needs to search through evacuation logs to find all entries related to "Pine Ridge". Which command would be most useful?

Options :

6406534157608. ✘ find -name "Pine Ridge"

6406534157609. ✓ grep "Pine Ridge" evacuation-logs.txt

6406534157610. ✘ ls "Pine Ridge"

6406534157611. ✘ cat evacuation-logs.txt

Question Number : 346 Question Id : 6406531230457 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

In a resource-constrained emergency environment, which deployment method would be MOST appropriate for the Python-based evacuation management system?

Options :

- 6406534157612. ✘ Running scripts locally on a single emergency responder's laptop
- 6406534157613. ✘ Distributing Python source code to all emergency personnel
- 6406534157614. ✓ Containerized deployment with Docker for consistent execution across multiple devices
- 6406534157615. ✘ Full cloud migration requiring constant internet connectivity

Question Number : 347 Question Id : 6406531230458 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Which computational tool would be MOST APPROPRIATE for optimizing the complex evacuation route considering multiple communities?

Options :

- 6406534157616. ✘ Microsoft Excel for manual distance calculations
- 6406534157617. ✘ Google Maps for route visualization
- 6406534157618. ✓ Python libraries like NetworkX or OR-Tools for route optimization
- 6406534157619. ✘ QGIS for static route mapping

Question Number : 348 Question Id : 6406531230459 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

What is the primary advantage of using the Haversine formula in emergency route planning?

Options :

- 6406534157620. ✘ Calculating exact road distances
- 6406534157621. ✘ Determining travel time under specific conditions
- 6406534157622. ✓ Computing great-circle distances on a spherical Earth
- 6406534157623. ✘ Measuring elevation changes in mountainous terrain

Sub-Section Number : 7

Sub-Section Id : 640653189603

Question Shuffling Allowed : No

Question Id : 6406531230460 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (349 to 359)

Question Label : Comprehension

Scenario 3

You are provided with a Gzipped Apache log file from a website having the below data in each row.

- IP: The IP address of the visitor
- Remote logname: The remote logname of the visitor. Typically "-"
- Remote user: The remote user of the visitor. Typically "-"
- Time: The time of the visit. E.g. [01/May/2024:00:00:00 +0000].
- Request: The request made by the visitor. E.g. GET /blog/ HTTP/1.1. It has 3 space-separated parts, namely (a) Method: The HTTP method. E.g. GET (b) URL: The URL visited. E.g. /blog/ (c) Protocol: The HTTP protocol. E.g. HTTP/1.1
- Status: The HTTP status code. If 200 <= Status < 300 it is a successful request
- Size: The size of the response in bytes. E.g. 1234
- Referrer: The referer URL. E.g. https://s-anand.net/
- User agent: The browser used. This will contain spaces and might have escaped quotes.
- Vhost: The virtual host. E.g. s-anand.net
- Server: The IP address of the server.

The fields are separated by spaces and quoted by double quotes (""). Unlike CSV files, quoted fields are escaped via "and not". All data is in the GMT-0500 timezone and the questions were based in this same time zone.

Use the information given and answer the sub-questions.

Note: Assume that you are using Python codes for log analysis

Sub questions

Question Number : 349 Question Id : 6406531230461 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Which of the following is a valid log entry based on the provided format?

Options :

6406534157624. ❌ 192.168.1.1 - - [12/Dec/2024:14:05:59 -0500] "GET /image.jpg HTTP/1.1" 200
1234 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko)
Chrome/87.0.4280.88 Safari/537.36" www.s-anand.net 192.254.190.217

6406534157625. ❌ 192.168.1.1 - - [12/Dec/2024:14:05:59 -0500] "POST /image.jpg INVALID" 200
1234 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko)
Chrome/87.0.4280.88 Safari/537.36" www.s-anand.net 192.254.190.217

6406534157626. ❌ 192.168.1.1 - - [12/Dec/2024:14:05:59 -0500] "PUT /image.jpg HTTP/1.1" OK
1234 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko)
Chrome/87.0.4280.88 Safari/537.36" www.s-anand.net 192.254.190.217

6406534157627. ✓ 203.0.113.7 - - [14/Dec/2024:16:45:11 -0500] "GET /index.html HTTP/1.1" 200
3500 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko)
Chrome/90.0.4430.93 Safari/537.36" www.s-anand.net 192.254.190.219

Question Number : 350 Question Id : 6406531230462 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Which of the following fields are necessary to filter "POST requests made for pages under /images/ from 15:00 to 18:00 on Mondays"?

Options :

6406534157628. ✓ Time, Request, Method, URL

6406534157629. ✗ Time, Method, Status, Size

6406534157630. ✗ Time, Method, URL, Referer

6406534157631. ✗ Time, Status, URL, Server

Question Number : 351 Question Id : 6406531230463 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

If the time in the log is stored in the format [01/May/2024:00:00:00 -0500], which of the following time formats should you use to parse it correctly?

Options :

6406534157632. ✓ %d/%b/%Y:%H:%M:%S %z

6406534157633. ✗ %Y/%m/%d %H:%M:%S

6406534157634. ✗ %d-%m-%Y %H:%M:%S

6406534157635. ✗ %Y-%m-%dT%H:%M:%SZ

Question Number : 352 Question Id : 6406531230464 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Which of the following methods is best for identifying if a log entry's timestamp corresponds to a Sunday?

Options :

6406534157636. ✗ Check if timestamp.dayname() == 'Sunday'

6406534157637. ✗ Check if timestamp.weekday() == 5

6406534157638. ✗ Check if timestamp.strftime('%A') == 'Sunday'

6406534157639. ✓ Check if timestamp.weekday() == 6

Question Number : 353 Question Id : 6406531230465 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

How would you identify log entries where the time is between 16:00 and 18:59 on Sundays?

Options :

6406534157640. ✗ Check if 16 <= timestamp.hour < 18

6406534157641. ✓ Check if 16 <= timestamp.hour < 19

6406534157642. ✗ Check if 16 < timestamp.hour < 19

6406534157643. ✗ Check if timestamp.hour in range(16, 20)

Question Number : 354 Question Id : 6406531230466 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

How would you extract the HTTP protocol version (e.g., HTTP/1.1) from the Request field "GET /blog/ HTTP/1.1"?

Options :

6406534157644. ✗ Use request.split('/')[1]

6406534157645. ✓ Use request.split(' ')[2]

6406534157646. ✗ Use request.split(' ')[1]

6406534157647. ✗ Use request.split('/')[2]

Question Number : 355 Question Id : 6406531230467 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

How would you extract the URL part from
the Request field GET/tamilmp3/HTTP/1.1?
(Assume that URL is extracted to the variable url)

Options :

6406534157648. ✓ Use request.split(' ')[1]

6406534157649. ✗ Use request.split(' ')[0]

6406534157650. ✗ Use request.split('/')[1]

6406534157651. ✗ Use request.split(' ')[2]

Question Number : 356 Question Id : 6406531230468 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Based on the answer given to the Previous
subquestion, which of the following checks
can be used to identify if a request URL is
for pages under /tamilmp3/?

Options :

6406534157652. ✘ '/tamilmp3/' in url

6406534157653. ✓ url.startswith('/tamilmp3/')

6406534157654. ✘ url == '/tamilmp3/'

6406534157655. ✘ url.endswith('/tamilmp3/')

Question Number : 357 Question Id : 6406531230469 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

How would you identify if the log entry's HTTP status code indicates a redirection request?
(Assume that status is correctly stored in the variable 'status')

Options :

6406534157656. ✘ status in [301, 302, 303]

6406534157657. ✘ 200 < status < 400

6406534157658. ✓ 300 <= status < 400

6406534157659. ✘ status in range(299, 400)

Question Number : 358 Question Id : 6406531230470 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

After filtering the log entries (in a list filtered_entries), which of the following is the best way to count the number of requests with a 404 status code for pages under /error/?

Options :

6406534157660. ✘ Use len(filtered_entries)

6406534157661. ✘ Use len(entries)

6406534157662. ✘ Use sum(1 for entry in entries)

6406534157663. ✓ None of these

Question Number : 359 Question Id : 6406531230471 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

If the count of log entries appears much larger than expected, which of the following could be the reason?

Options :

6406534157664. ✘ The filter for Monday is incorrect.

6406534157665. ✘ The filter for time range is incorrect.

6406534157666. ✘ The filter for HTTP method is incorrect.

6406534157667. ✓ Any of these could be the reason.

Sub-Section Number :	8
Sub-Section Id :	640653189604
Question Shuffling Allowed :	No

Question Id : 6406531230472 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (360 to 363)

Question Label : Comprehension

Scenario 4

A climate science professor is developing an AI-powered learning assistant called ClimateBot to help students understand complex climate modeling techniques and computational approaches to environmental data analysis.

Guidelines for ClimateBot:

- Engage students through thought-provoking questions
- Encourage independent problem-solving
- Guide students to discover solutions autonomously
- Provide conceptual insights, not direct answers
- Help students develop robust computational and analytical skills

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 360 Question Id : 6406531230473 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

What is the primary purpose of the system prompt in controlling an AI learning assistant's behavior?

Options :

6406534157668. ❌ To create a fixed set of predetermined responses for every possible student query

6406534157669. ✓ To define the core communication strategy, learning approach, and interaction guidelines

6406534157670. ❌ To replace the need for human instructor guidance completely

6406534157671. ❌ To limit the AI's ability to understand complex scientific concepts

Question Number : 361 Question Id : 6406531230474 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Choose the **best system prompt** that achieves the instructor's goals.

Options :

6406534157672. ❌ "You are a climate science assistant. Provide direct answers and complete code solutions whenever students ask."

6406534157673. ✓ "You are an interactive learning assistant for climate science. Guide students through complex concepts by asking reflective questions. Avoid giving direct solutions. Encourage independent thinking and help students develop problem-solving skills."

6406534157674. ❌ "You are a simple computational tool. Provide exact numerical answers and full code implementations for any climate modeling question."

6406534157675. ❌ "You are a climate science assistant. Help students and tell them to consult textbooks for all information."

Question Number : 362 Question Id : 6406531230475 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

A student asks: "How do I calculate the global warming potential of different greenhouse gases?"

Choose the most pedagogically effective response:

Options :

6406534157676. ❌ "The global warming potential (GWP) is calculated by multiplying the gas's radiative efficiency by its atmospheric lifetime. Here's the exact formula: [provides complete formula and calculation method]"

6406534157677. ❌ "Global warming potential (GWP) is determined by factors like a gas's molecular structure, atmospheric lifetime, and interaction with radiation. Different gases have different GWPs based on these characteristics."

6406534157678. ✓ "Let's break this down. What do you already know about greenhouse gases and their impact on climate? Have you considered how different molecules might have varying abilities to trap heat?"

6406534157679. ❌ "I cannot help you with this calculation. Please refer to your textbook for a complete explanation."

Question Number : 363 Question Id : 6406531230476 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Assume that the ClimateBot, an advanced learning assistant for climate science students. Its primary mission is to foster critical thinking, scientific reasoning, and deep understanding of complex environmental systems by using a **RAG (Retrieval-Augmented Generation) system**. The RAG system works as follows:

1. Climate Data Storage: Comprehensive climate research materials (like reports, research papers and notes) are split into **smaller chunks**. Each chunk is vectorized using an embedding model.

2. **Vector Database:** The vectorized chunks are stored in a **FAISS or Weaviate vector database**.
3. **Retriever:** When a student asks a question, the system retrieves the most relevant content (based on semantic similarity) from the vector database.
4. **LLM Contextualization:** The retrieved content is added as context in the assistant's prompt, which is then used by the **LLM (like GPT-4)** to generate a personalized, context-aware response.

Which of the following **correctly describes the process flow of a RAG-based system** for the IITM TDS Teaching Assistant?

Options :

Student Query → LLM Direct Answer
6406534157680. ✘ → Response Sent Back

Student Query → Chunk Course Material
→ Vectorize Query → Retrieve Matching
6406534157681. ✘ Content → LLM Generates Response

Student Query → Vectorize Query
→ Retrieve Content from Vector
Database → Pass Retrieved Content to LLM
6406534157682. ✓ → LLM Generates Context-Aware Response

Student Query → Use Rule-Based
System to Find Answer → Use Pre-Written
6406534157683. ✘ Response → Response Sent Back