

Indian Institute of Technology, Madras - Centre for Continuing Education

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 DEGREE ET1 EXAM QPE2 S1 03 Sep
Subject Name :	2023 Sep03: IIT M DEGREE ET1 EXAM QPE2
Creation Date :	2023-08-30 16:06:08
Duration :	180
Total Marks :	795
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 :	64065314256
Group Maximum Duration :	0
Group Minimum Duration :	90
Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	795
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
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

Section Id :	64065341424
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	25
Number of Questions to be attempted :	25
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 :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	64065388881
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 1 Question Id : 640653614336 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : SOFTWARE ENGINEERING (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 :

6406532050828. ✓ YES

6406532050829. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 64065388882

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 2 Question Id : 640653614337 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Which of the following teams in a software organization is primarily responsible for laying down the terms of service for its software products?

Options :

6406532050830. ✗ Sales team

6406532050831. ✗ Support team

6406532050832. ✓ Ethics and policy specialists

6406532050833. ✗ Data scientists

Question Number : 3 Question Id : 640653614338 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

IDEs are very useful in the software development process, mainly because_____.

Options :

6406532050834. ❌ they are useful in documenting and archiving knowledge of one project so that it can be reused in another project

6406532050835. ❌ they are useful for sharing documents and archiving decisions

6406532050836. ❌ they enable all the members of the team to get a big picture as well as a detailed view of progress in the software development

6406532050837. ✓ they help the developers become more productive

Question Number : 4 Question Id : 640653614339 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Which of the hosting options requires the purchase of the entire server hardware?

Options :

6406532050838. ✓ Bare Metal Servers

6406532050839. ❌ Infrastructure-as-a-service

6406532050840. ❌ Platform-as-a-service

6406532050841. ❌ None of these

Question Number : 5 Question Id : 640653614347 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Which of the performance enhancement strategies of the web applications suggests compressing the static pages using tools like Brotli and Gzip?

Options :

6406532050870. ✘ Caching

6406532050871. ✓ Quick loading and rendering

6406532050872. ✘ Task queues

6406532050873. ✘ Monitoring

Question Number : 6 Question Id : 640653614348 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Which of the deployment environments provides the developers with tools like the IDE and others to build, run, and test code?

Options :

6406532050874. ✓ Development environment

6406532050875. ✘ Testing environment

6406532050876. ✘ Staging environment

6406532050877. ✘ Production environment

Question Number : 7 Question Id : 640653614354 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Suppose a project consists of some modules, and all of them share a common global data structure. What kind of coupling exists between these modules?

Options :

6406532050894. ✘ Data coupling

6406532050895. ✘ Control coupling

6406532050896. ✓ Common coupling

6406532050897. ✘ Content coupling

Question Number : 8 Question Id : 640653614357 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

GIT is a _____.

Identify the appropriate option to fill in the blank.

Options :

6406532050906. ✘ Compiler

6406532050907. ✘ Integrated development environment

6406532050908. ✓ Version control system

6406532050909. ✘ Web application framework

Question Number : 9 Question Id : 640653614360 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Which of the following is a type of performance testing?

Options :

6406532050918. ✘ Alpha testing

6406532050919. ✘ Beta testing

6406532050920. ❌ Smoke testing

6406532050921. ✓ Stress testing

Sub-Section Number : 3

Sub-Section Id : 64065388883

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 10 Question Id : 640653614340 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Suppose a music production software is designed to help musicians create high-quality tracks. The software takes in audio recordings and applies a series of modules to refine and enhance the sound. Each module focuses on different aspects such as equalization, compression, and reverb. The output of each module is connected to the input of the next, ultimately resulting in a polished audio track.

What type of software architecture is most likely used for the music production software?

Options :

6406532050842. ❌ Client-server system

6406532050843. ✓ Pipe and filter

6406532050844. ❌ Model view controller

6406532050845. ❌ Peer-to-peer architecture

Question Number : 11 Question Id : 640653614341 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

During debugging, when a developer refers to documentation and code examples to understand the proper usage of an API or library without looking at the internal code implementation, which debugging strategy is being used?

Options :

6406532050846. ❌ Backwards debugging

6406532050847. ✓ Blackbox debugging

6406532050848. ❌ Forwards debugging

6406532050849. ❌ Input manipulation debugging

Question Number : 12 Question Id : 640653614359 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

A language learning app offers users the option to quickly access their most frequently practiced lessons without navigating through multiple menus. It also provides a feature to mark lessons as favorites, along with tracking the user's progress and performance. Which of the following Usability Goals is **NOT** being focussed on in the above mentioned features for the language learning app?

Options :

6406532050914. ❌ Efficiency

6406532050915. ✓ Safe to use

6406532050916. ❌ Learnability

6406532050917. ❌ Memorability

Sub-Section Number :

4

Sub-Section Id :

64065388884

Question Shuffling Allowed :

Yes

Is Section Default? :

null

Question Number : 13 Question Id : 640653614342 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Suppose the risk assessed for schedule slippage is 1.6. The impact of the risk due to schedule slippage is 2. What is the probability of schedule slippage occurring during project development?

Options :

6406532050850. ✘ 0.4

6406532050851. ✘ 0.32

6406532050852. ✓ 0.8

6406532050853. ✘ 0.25

Question Number : 14 Question Id : 640653614344 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Match the following requirement gathering techniques with what they are good for.

Techniques	Good for
1. Interviews	A. Good for collecting multiple viewpoints
2. Focus groups	B. Good for exploring issues
3. Naturalistic observations	C. Good for Procedures, regulations and standards
4. Documentation	D. Good for understanding context

Options :

6406532050858. ✓ 1- B, 2- A, 3-D, 4- C

6406532050859. ✘ 1- B, 2- A, 3-C, 4- D

6406532050860. ✘ 1- A, 2- B, 3-D, 4- C

6406532050861. ✘ 1- A, 2- B, 3-C, 4- D

Question Number : 15 Question Id : 640653614345 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following two requirements:

Requirement 1: The website must support a maximum of 100 registration requests per second.

Requirement 2: The website must provide a registration page that allows the customers to register themselves on the website to avail of the rest of the services offered.

Which of the following statement is true?

Options :

6406532050862. ✘ Requirement 1 is a functional requirement, whereas Requirement 2 is a non-functional requirement.

6406532050863. ✓ Requirement 2 is a functional requirement, whereas Requirement 1 is a non-functional requirement.

6406532050864. ✘ Both requirements are functional requirements

6406532050865. ✘ Both requirements are non-functional requirements.

Question Number : 16 Question Id : 640653614355 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Suppose in a web application there is a class called *Logger* that has a method *log(e: Event)* to log different types of events in a log file. The other classes in the web application are associated with the *Logger* class to log various events.

Later, the development team realized that some of the special kinds of events had to be logged into the database. Instead of modifying the existing *Logger* class, the *Logger* class is extended (inherited) to another class *DBLogger* and added the new method *dbLog(e: Event)* to log the events to the database.

In the above scenario, which of the SOLID principles is satisfied?

Options :

6406532050898. ✘ Single Responsibility Principle

6406532050899. ✓ Open-Closed Principle

6406532050900. ✘ Interface Segregation Principle

6406532050901. ✘ Dependency Inversion Principle

Question Number : 17 Question Id : 640653614356 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Suppose a programming framework has been proposed that has a wide range of data structures. The designer of the framework wants that the clients will be able to access the elements of the data structure as per the specific rules of the given data structure; however, the clients may not know how the elements are stored in the data structures. Therefore, the behavior "how the elements are accessed" is separated into a different class, which can be used with any data structure within the framework, and it enables accessing the elements of any data structure in the same manner. Which design pattern is followed in the designing process?

Options :

6406532050902. ✘ Adapter design pattern

6406532050903. ✘ Observer design pattern

6406532050904. ✘ Facade design pattern

6406532050905. ✓ Iterator design pattern

Question Number : 18 Question Id : 640653614358 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

A software organization is planning to build an AI-based application to predict the chances of a candidate's success in a particular recruitment drive. The organization wants to estimate the time and effort it will take to complete the project. To achieve an accurate estimation, they assembled a group of experienced project managers and developers. Each individual is given a detailed project plan and a form to record their time estimates. These estimates are then collected, compiled, and averaged by a designated coordinator. The process is repeated multiple times to refine the time estimation.

What estimation technique is being utilized in this scenario?

Options :

6406532050910. ✘ Expert judgment

6406532050911. ✓ Delphi technique

6406532050912. ✘ COCOMO model

6406532050913. ✘ All of these

Question Number : 19 Question Id : 640653614361 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

A organization wants to deploy a new version of a web application. In order to do that they have created a new production environment for the new version of the web application without affecting the present one, and after sufficient testing of the new version, the users are routed

from the current environment to the new environment.

Which of the software deployment strategies is followed in this case?

Options :

6406532050922. ✓ Blue/Green deployment

6406532050923. ✗ Canary deployment

6406532050924. ✗ Versioned deployment

6406532050925. ✗ None of these

Question Number : 20 Question Id : 640653614362 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following user story.

Feature 2: Invite team members

As a project manager,

I want to invite other members of my team to this project management platform so that I can continuously track if the project progress is as per the schedule

Which is refined as follows:

Feature 2: Invite team members

As a project manager,

I want to invite other members of my team using their email id or mobile number to this project management platform so that I can continuously track if the project progress is as per the schedule

This refinement makes the user story _____.

Options :

6406532050926. ✓ Specific

6406532050927. ✗ Measurable

6406532050928. ✗ Achievable

6406532050929. ✗ Relevant

Sub-Section Number : 5

Sub-Section Id : 64065388885

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 21 Question Id : 640653614346 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements about the waterfall model is/are correct?

Options :

6406532050866. ✓ All the phases of the software engineering process take place in sequential order.

6406532050867. ✗ It is an incremental model.

6406532050868. ✗ It is easy and cost-effective to accommodate the changes in the software if the client does not like some features.

6406532050869. ✗ Most of the phases of the software engineering process can be carried out simultaneously

Question Number : 22 Question Id : 640653614352 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following integration testing approaches may require drivers?

Options :

6406532050886. ❌ Big bang approach

6406532050887. ✓ Bottom up approach

6406532050888. ❌ Top down approach

6406532050889. ✓ Mixed approach

Sub-Section Number : 6

Sub-Section Id : 64065388886

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 23 Question Id : 640653614343 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

A financial budgeting application allows users to input their monthly expenses and income. The app automatically calculates the user's total savings at the end of each month and provides visual cues for overspending in different expense categories. It also prevents users from inputting negative values or leaving essential fields blank. Which of the following heuristics of UI evaluation does the financial budgeting app adhere to?

Options :

6406532050854. ✓ Show status

6406532050855. ❌ Support error recovery

6406532050856. ✓ Prevent errors

6406532050857. ❌ Provide help

Question Number : 24 Question Id : 640653614353 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

A car is a vehicle, and a car has an engine.

Suppose we are modeling the information in the above statement into a class diagram, and car, vehicle, and engine are the three classes. Identify the correct relationships from the given options.

Options :

6406532050890. ✓ car has an inheritance relationship with vehicle

6406532050891. ✗ car has an composition relationship with vehicle

6406532050892. ✗ engine has an inheritance relationship with car

6406532050893. ✓ engine has an composition relationship with car

Sub-Section Number : 7

Sub-Section Id : 64065388887

Question Shuffling Allowed : No

Is Section Default? : null

Question Id : 640653614349 Question Type : COMPREHENSION Sub Question Shuffling

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

Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (25 to 26)

Question Label : Comprehension

Consider the following code segment:

```
if age >= 18 and age <= 60:  
    print("eligible")  
else:  
    print("not eligible")
```

Based on the above code, answer the given subquestions.

Sub questions

Question Number : 25 Question Id : 640653614350 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following sets of test cases provide/s branch coverage of the given code segment?

Options :

6406532050878. ✘ {18, 60}

6406532050879. ✓ {30, 75}

6406532050880. ✘ {10, 75}

6406532050881. ✓ {10, 30, 75}

Question Number : 26 Question Id : 640653614351 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following sets of test cases provide/s multiple condition coverage of the given code segment?

Options :

6406532050882. ✘ {18, 60}

6406532050883. ✘ {30, 75}

6406532050884. ✘ {10, 30}

6406532050885. ✓ {10, 30, 75}

Sw Testing

Section Id :	64065341425
Section Number :	2
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 :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	64065388888
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 27 Question Id : 640653614363 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : SOFTWARE TESTING (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 :

6406532050930. ✓ YES

6406532050931. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 64065388889

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 28 Question Id : 640653614364 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following parameters of the software system are tested in security testing?

Options :

6406532050932. ✓ Confidentiality

6406532050933. ✗ Compatibility

6406532050934. ✗ Reliability

6406532050935. ✓ Availability

Sub-Section Number :	3
Sub-Section Id :	64065388890
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 29 Question Id : 640653614365 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4

Question Label : Multiple Choice Question

Which type of software metric involves parameters like team size, project cost, schedule, and productivity?

Options :

6406532050936. ❌ Product metrics

6406532050937. ❌ Process metrics

6406532050938. ✓ Project metrics

6406532050939. ❌ Software quality metrics

Question Number : 30 Question Id : 640653614376 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4

Question Label : Multiple Choice Question

Which kind of client-side testing tries to verify web applications by executing test cases that break the normal execution sequence?

Options :

6406532050968. ❌ User-session data based testing

6406532050969. ❌ Value level bypass testing

6406532050970.

* Parameter level bypass testing

6406532050971. ✓ Control flow level bypass testing

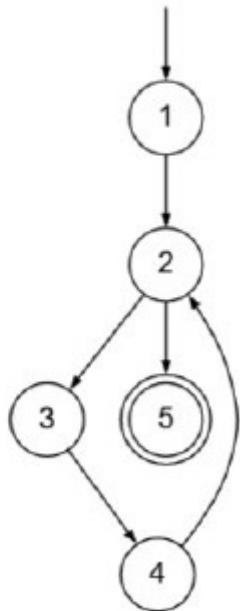
Sub-Section Number :	4
Sub-Section Id :	64065388891
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Id : 640653614366 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (31 to 32)

Question Label : Comprehension

Consider the control flow graph (CFG) below.



Based on the above data , answer the given sub questions.

Sub questions

Question Number : 31 Question Id : 640653614367 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

Identify the number of prime paths in the given CFG.

Options :

6406532050940. ✘ 4

6406532050941. ✘ 5

6406532050942. ✓ 6

6406532050943. ✘ 7

Question Number : 32 Question Id : 640653614368 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

What is the minimum number of test paths required for prime path coverage?

Options :

6406532050944. ✘ 1

6406532050945. ✓ 2

6406532050946. ✘ 3

6406532050947. ✘ 4

Question Id : 640653614372 Question Type : COMPREHENSION Sub Question Shuffling

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

Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (33 to 34)

Question Label : Comprehension

Consider the code segment of a Java servlet below. The atomic sections are marked as P_1, P_2, P_3, \dots .

	<pre>/* salary_comp stores values for different components of salary like (basic, DA, TA, etc.) of an employee */ ArrayList<Double> salary_comp = null; response.setContentType("text/html"); PrintWriter out = response.getWriter();</pre>
P_1	<pre>out.print("<HTML><HEAD><TITLE>"); out.print("Eligibility for bonus"); out.println("</TITLE></HEAD><BODY>\""); String emp_id = request.getParameter("EID"); /* getSalaryComponents() considers the employee ID (emp_id) as input, runs a query in the database, and returns an ArrayList object containing the values for different components of the salary of the given employee */ salary_comp = getSalaryComponents(emp_id); double total_salary = 0.0;</pre>
	<pre>if(salary_comp != null) {</pre>
P_2	<pre> for (Double c : salary_comp) { total_salary += c; } if(total_salary < 25000.00) {</pre>
P_3	<pre> out.println("Status : Eligible</BR>"); } else {}</pre>
P_4	<pre>}</pre>
P_5	<pre>else{ out.println("Invalid employee ID</BR>");</pre>
P_6	<pre>}</pre>
	<pre>out.println ("</BODY></HTML>"); out.close();</pre>

Based on the above data , answer the given sub questions.

Sub questions

Question Number : 33 Question Id : 640653614373 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 6

Question Label : Multiple Choice Question

Identify the component expression corresponding to the given code .

Options :

6406532050956. ✘ $P_1 \cdot (P_2^* \cdot P_3 \cdot (P_4|P_5))|P_6$

6406532050957. ✘ $P_1 \cdot (P_2|(P_3^* \cdot (P_4|P_5))) \cdot P_6$

6406532050958. ✓ $P_1 \cdot ((P_2^* \cdot (P_3|P_4))|P_5) \cdot P_6$

6406532050959. ✘ $P_1 \cdot ((P_2^*|P_3) \cdot (P_4|P_5)) \cdot P_6$

Question Number : 34 Question Id : 640653614374 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4

Question Label : Multiple Choice Question

Identify the empty atomic section in the given code.

Options :

6406532050960. ✘ P_2

6406532050961. ✘ P_3

6406532050962. ✓ P_4

6406532050963. ✘ P_5

Question Id : 640653614383 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Question Numbers : (35 to 36)

Question Label : Comprehension

Consider the following code segment for symbolic testing and answer the given subquestions.

```
//code base
int Product(int n) {
    int prod = 1;
    int r;
    for(int i = 0; i < n; i++) {
        r = sym_input();
        if(r == 0)
            break;
        prod *= r;
    }
    return prod;
}
```

Sub questions

Question Number : 35 Question Id : 640653614384 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

Identify the appropriate program condition (PC) for the `for` loop with a sequence m of `trues` followed by a `false`. Consider each r_i is a fresh symbolic value.

Options :

6406532050996. ✓ $(\bigwedge_{[0,m-1]}(r_i \neq 0)) \wedge (r_m == 0)$

6406532050997. ✗ $(\bigwedge_{[1,m]}(r_i == 0)) \wedge (r_{m+1} \neq 0)$

6406532050998. ✶ $(\bigwedge_{[0,n-1]}(r_i \neq 0)) \wedge (r_n == 0)$

6406532050999. ✶ $(\bigwedge_{[0,n]}(r_i \neq 0)) \wedge (r_{n+1} == 0)$

Question Number : 36 Question Id : 640653614385 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

Identify the value of *prod* at the end of the symbolic execution of the **for** loop with a sequence of *m* **true**s followed by a **false**.

Options :

6406532051000. ✶ $\{r \mapsto r_n, prod \mapsto \prod_{i \in [0,n-1]} r_i\}$

6406532051001. ✶ $\{r \mapsto r_{m+1}, prod \mapsto \prod_{i \in [1,m]} r_i\}$

6406532051002. ✓ $\{r \mapsto r_m, prod \mapsto \prod_{i \in [0,m-1]} r_i\}$

6406532051003. ✶ $\{r \mapsto r_{m+n}, prod \mapsto \prod_{i \in [1,m+n]} r_i\}$

Sub-Section Number : 5

Sub-Section Id : 64065388892

Question Shuffling Allowed : No

Is Section Default? : null

Question Id : 640653614369 Question Type : COMPREHENSION Sub Question Shuffling

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

Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (37 to 38)

Question Label : Comprehension

Consider the predicate $p = (\neg a \vee \neg b) \wedge c$.

Based on the above data , answer the given subquestions.

Sub questions

Question Number : 37 Question Id : 640653614370 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

What will be p_a ?

Options :

6406532050948. ❌ $(\neg b \wedge \neg c)$

6406532050949. ❌ $(\neg b \vee \neg c)$

6406532050950. ✓ $(b \wedge c)$

6406532050951. ❌ $(b \vee c)$

Question Number : 38 Question Id : 640653614371 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6

Question Label : Multiple Choice Question

From the given options identify all pairs test requirements to satisfy restricted inactive clause coverage (RICC) for clause a .

Options :

6406532050952. ❌ $\{(a = T, b = T, c = T), (a = F, b = T, c = T)\}$

6406532050953. ❌ $\{(a = T, b = F, c = F), (a = F, b = F, c = F)\}$
 $\{(a = T, b = F, c = T), (a = F, b = F, c = T)\}$

6406532050954. ✓ $\{(a = T, b = T, c = F), (a = F, b = T, c = F)\}$
 $\{(a = T, b = F, c = T), (a = F, b = F, c = T)\}$
 $\{(a = T, b = F, c = F), (a = F, b = F, c = F)\}$

6406532050955. ❌ $\{(a = T, b = T, c = F), (a = F, b = T, c = F)\}$
 $\{(a = T, b = T, c = T), (a = F, b = T, c = T)\}$
 $\{(a = T, b = F, c = T), (a = F, b = F, c = T)\}$

Sub-Section Number : 6

Sub-Section Id : 64065388893

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 39 Question Id : 640653614375 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6

Question Label : Multiple Choice Question

"For testing a web application, testing each layer separately and their integration is also important."

Match the following from the above context of web application layers:

Layer	Roles
1. Presentation layer	A. Permanent data storage to methods within the class
2. Data content layer	B. Computation, data access
3. Data representation layer	C. HTML, output and UI
4. Data storage layer	D. In-memory data storage

Options :

6406532050964. ✘ 1-B, 2-C, 3-A, 4-D

6406532050965. ✘ 1-B, 2-C, 3-D, 4-A

6406532050966. ✘ 1-C, 2-B, 3-A, 4-D

6406532050967. ✓ 1-C, 2-B, 3-D, 4-A

Sub-Section Number : 7

Sub-Section Id : 64065388894

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 40 Question Id : 640653614386 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the following classes for the code base to be tested and the test class.

```
//code base
public class Numbers {
    private int[] num;
    public Numbers(int[] num) {
        this.num = num;
    }
    //find the frequency of a digit
    public int countFreq(int key) {
        int count = 0;
        for(int i = 0; i < num.length - 1; i++)
            if(num[i] == key)
                ++count;
        return count;
    }
}
//test class
import static org.junit.Assert.*;
import org.junit.Test;

public class NumbersTest {
    private Numbers n;
    @Test
    public void testCase1() {
        int[] a = {20, 50, 10, 50, 50};
        n = new Numbers(a);
        assertTrue(n.countFreq(50) == 3);
    }
    @Test
    public void testCase2() {
        int[] a = {10, 50, 10, 10, 50};
        n = new Numbers(a);
        assertTrue(n.countFreq(10) == 3);
    }
    @Test
    public void testCase3() {
        int[] a = {10, 20, 10, 20, 50};
        n = new Numbers(a);
        assertEquals(2, n.countFreq(20));
    }
    @Test
    public void testCase4() {
        int[] a = {10, 20, 10, 20, 50};
        n = new Numbers(a);
        assertEquals(1, n.countFreq(50));
    }
}
```

Identify the test case method(s) that will fail for the given code base.

Options :

6406532051004. ✓ testcase1()

6406532051005. ✗ testcase2()

6406532051006. ✗ testcase3()

6406532051007. ✓ testcase4()

Sub-Section Number :	8
Sub-Section Id :	64065388895
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 41 Question Id : 640653614377 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

Consider the following Java program.

```

class A{
    private int x;
    public A() { x = 0; }
    public void set(int _x) {
        this.x = _x;
    }
}

class B extends A{
    private int y;
    public void setY(int _y) {
        y = _y;
    }
}

class C extends B{
    private int z;
    public void set(int _x, int _z) {
        x = _x;
        z = _z;
    }
}

public class Ex1 {
    public static void main(String[] args) {
        C obj = new C();
        obj.set(10, 20);
    }
}

```

On compilation, the above program generates an error: "The field A.x is not visible". Identify the type of anomaly/fault in the given scenario.

Options :

6406532050972. ✖ Inconsistent type use

6406532050973. ✖ State definition anomaly

6406532050974. ✖ State definition inconsistency anomaly

6406532050975. ✓ State visibility anomaly

Question Number : 42 Question Id : 640653614378 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

Consider the following Java program.

```
class A{
    public void f() { }
    public void g() { }
    public void h() { }
}
class B extends A{
    public void g() { }
    public void i() { }
}
class C extends B{
    public void f() { }
    public void i() { }
}
public class Ex1 {
    public static void main(String[] args) {
        C obj = new C();
        obj.f();
        obj.g();
        obj.h();
        obj.i();
    }
}
```

Which of the following sets of the methods will be invoked in the above program?

Options :

6406532050976. ✘ {C::f(), A::g(), A::h(), C::i()}

6406532050977. ✘ {A::f(), B::g(), A::h(), B::i()}

6406532050978. ✘ {A::f(), A::g(), A::h(), C::i()}

6406532050979. ✓ {C::f(), B::g(), A::h(), C::i()}

Question Number : 43 Question Id : 640653614379 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

Given a context free grammar over a finite alphabet $\Sigma = \{a, b\}$, with the production rules as follows:

$$S \rightarrow aXbb,$$

$$X \rightarrow abb.$$

Let S be the starting variable. Which of the following sets below corresponds to the language generated by the given grammar?

Options :

6406532050980. ✘ $\{a^n b^{2n} \mid n \geq 1\}$

6406532050981. ✓ $\{a^n b^{2n} \mid n \geq 2\}$

6406532050982. ✘ $\{(abb)^n \mid n \geq 1\}$

6406532050983. ✘ $\{(abb)^n \mid n \geq 2\}$

Question Number : 44 Question Id : 640653614380 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

Mutations of the statement `if(x > y)` to statements like `if(x >= y)`, `if(x <= y)`, `if(x < y)`, etc. are examples of which kind of mutation operator?

Options :

6406532050984. ✘ Conditional operator replacement

6406532050985. ✘ Logical operator replacement

6406532050986. ✓ Relational operator replacement

6406532050987. ✘ Unary operator insertion

Question Number : 45 Question Id : 640653614381 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

An academic institution has announced scholarships on merit for its students. The scholarship price is calculated as follows:

- If the CGPA is ≥ 91 and ≤ 100 , then Rs. 1,00,000/- per annum.
- If the CGPA is ≥ 81 and ≤ 90 , then Rs. 50,000/- per annum.
- If the CGPA is ≥ 71 and ≤ 80 , then Rs. 25,000/- per annum.
- If the CGPA is ≥ 0 and ≤ 70 , then there will be no scholarship.

A software application has been developed to calculate the scholarship, which needs to be tested. What is the minimum number of test cases to be prepared for testing the software system using the equivalence class partitioning technique?

Options :

6406532050988. ✘ 4

6406532050989. ✓ 5

6406532050990. ✘ 6

6406532050991. ✘ 7

Question Number : 46 Question Id : 640653614382 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

Let the three partitions with blocks be [“MALE”, “FEMALE”, “OTHER”], $[0 \leq AGE < 18, 60 \leq AGE \geq 18, AGE > 60]$, and [“Rural”, “Urban”, “Suburban”]. What will be the minimum number of tests that need to be prepared using the Each Choice Coverage (ECC) criteria?

Options :

6406532050992. ✓ 3

6406532050993. ✗ 6

6406532050994. ✗ 18

6406532050995. ✗ 27

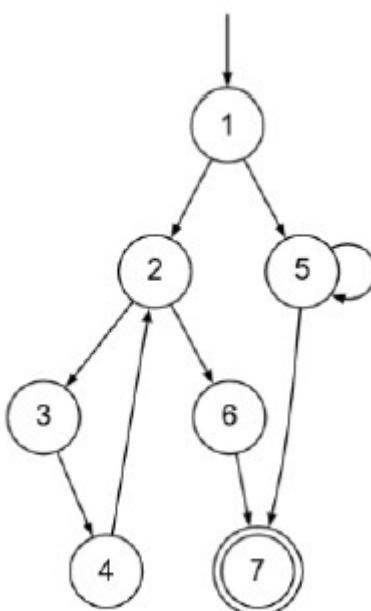
Question Number : 47 Question Id : 640653614387 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

Consider the control flow graph (CFG) below.



What is the cyclomatic complexity?

Options :

6406532051008. ✓ 4

6406532051009. ✘ 5

6406532051010. ✘ 6

6406532051011. ✘ 7

AI

Section Id :	64065341426
Section Number :	3
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	8
Number of Questions to be attempted :	8
Section Marks :	25
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	64065388896
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 48 Question Id : 640653614388 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : AI: SEARCH METHODS FOR PROBLEM SOLVING (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 :

6406532051012. ✓ YES

6406532051013. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 64065388897

Question Shuffling Allowed : No

Is Section Default? : null

Question Id : 640653614389 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (49 to 53)

Question Label : Comprehension

SEARCH

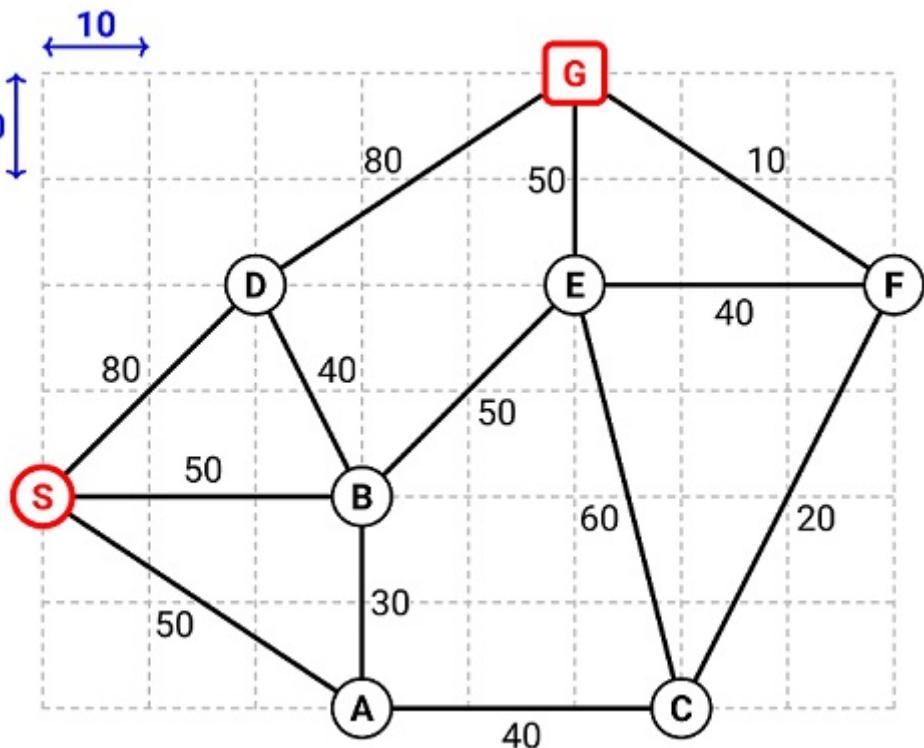
The figure shows a map on a uniform grid where each tile is 10x10 in size.

The start node is S and the goal node is G.

The MoveGen function returns nodes in alphabetical order.

Use Manhattan Distance as the heuristic function.

Tie-breaker: If several nodes have the same cost, use node labels to break the tie.



Based on the above data, answer the given subquestions.

Sub questions

Question Number : 49 Question Id : 640653614390 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Short Answer Question

What is the path found by the Depth First Search algorithm? Enter the path as a comma separated list of node labels.

NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEous CHARACTERS.

Answer format: S,X,Y,Z

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

S,A,C,E,G

Question Number : 50 Question Id : 640653614391 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Short Answer Question

What is the path found by the Best First Search algorithm? Enter the path as a comma separated list of node labels.

NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEous CHARACTERS.

Answer format: S,X,Y,Z

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

S,D,G

Question Number : 51 Question Id : 640653614392 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Short Answer Question

What is the path found by A* search algorithm? Enter the path as a comma separated list of node labels.

NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEous CHARACTERS.

Answer format: S,X,Y,Z

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

S,B,E,G

Question Number : 52 **Question Id :** 640653614393 **Question Type :** SA **Calculator :** None

Response Time : N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 1

Question Label : Short Answer Question

What is the path found by Branch-and-Bound search algorithm? Enter the path as a comma separated list of node labels.

Use the Branch-and-Bound variation that avoids cyclic expansions like S,A,S,A,S,A,...

NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEous CHARACTERS.

Answer format: S,X,Y,Z

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

S,A,C,F,G

Question Number : 53 **Question Id :** 640653614394 **Question Type :** MCQ **Is Question**

Mandatory : No **Calculator :** None **Response Time :** N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 1

Question Label : Multiple Choice Question

For the given map, which algorithm finds the shortest path from S to G?

Options :

6406532051018. ❌ A* Search Algorithm

6406532051019. ✓ Branch-and-Bound Search Algorithm

6406532051020. ❌ None of these

Sub-Section Number : 3

Sub-Section Id : 64065388898

Question Shuffling Allowed : No

Is Section Default? : null

Question Id : 640653614395 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (54 to 57)

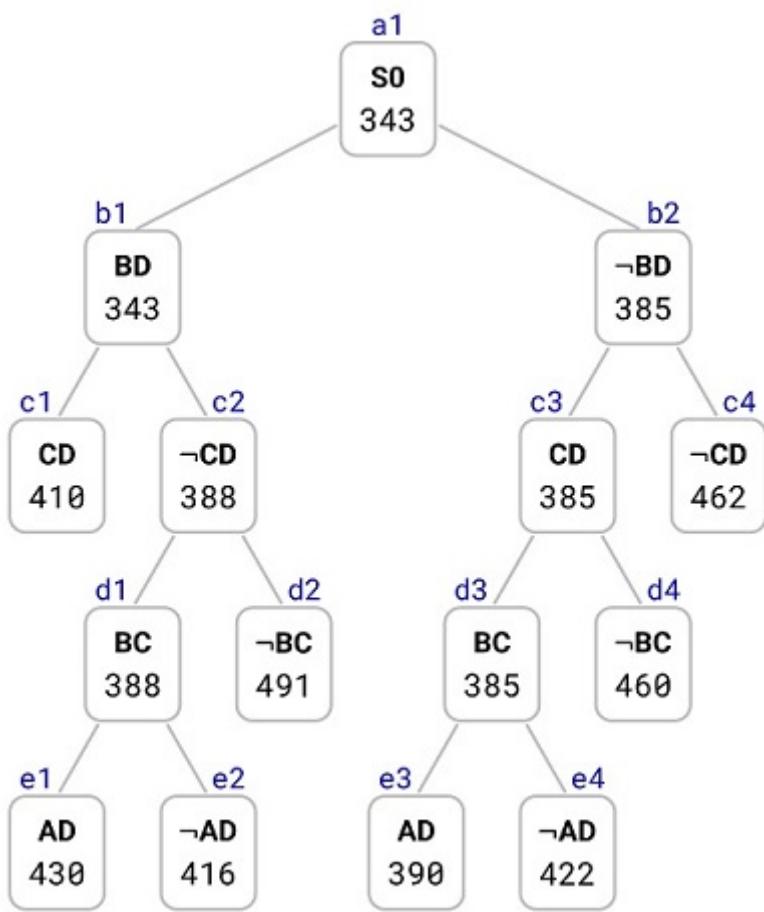
Question Label : Comprehension

TSP Branch-and-Bound

The TSP Branch-and-Bound algorithm is solving a TSP instance where the cities are A, B, C, and so on. The Branch-and-Bound search tree at the time when the algorithm has discovered the optimal tour is shown below.

Each node in the search tree displays an edge (either XY or ~XY), a cost value, and a unique reference number (a1, b1, b2, ..., c1, ..., d1, ..., e1, ..., e4). Use the reference numbers to breakties. When required, enter the reference numbers in short answers.

What information can you glean from the search tree? Answer the sub-questions based on the information gleaned from the search tree.



Sub questions

Question Number : 54 Question Id : 640653614396 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Short Answer Question

Let S0 (ref. no. a1) be the first node to be refined, identify the next 4 nodes (2nd to 5th node) that are refined by the TSP Branch-and-Bound algorithm. Enter the nodes (node reference numbers) in the order they are refined.

Enter a comma separated list of node reference numbers.

NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEous CHARACTERS.

Answer format: a9,b9,c9,d9

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

b1,b2,c3,d3

Question Number : 55 **Question Id :** 640653614397 **Question Type :** SA **Calculator :** None

Response Time : N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 1

Question Label : Short Answer Question

Which node represents the optimal tour and what is the cost of the optimal tour? Enter the node reference number and the tour cost in the text box, or enter NIL if it is not possible to determine the optimal tour.

Enter a node reference number followed by tour cost, separated by comma.

NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEOUS CHARACTERS.

Answer format: a9,42

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

e3,390

Question Number : 56 **Question Id :** 640653614398 **Question Type :** SA **Calculator :** None

Response Time : N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 1

Question Label : Short Answer Question

Determine the number of cities in the TSP instance. Enter the number of cities in the text box, or enter NIL if it is not possible to determine the number of cities.

Enter an integer.

NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEous CHARACTERS.

Answer format: 42

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

5

Question Number : 57 **Question Id :** 640653614399 **Question Type :** SA **Calculator :** None

Response Time : N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 1

Question Label : Short Answer Question

Start from city A, what is the path representation of the optimal tour? Enter the path representation in the text box, or enter NIL if it is not possible to determine the optimal tour.

Enter a comma separated list of cities (city labels).

NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEous CHARACTERS.

Answer format: A,B,C

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Set

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

A,D,C,B,E

A,E,B,C,D

Question Id : 640653614400 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (58 to 61)

Question Label : Comprehension

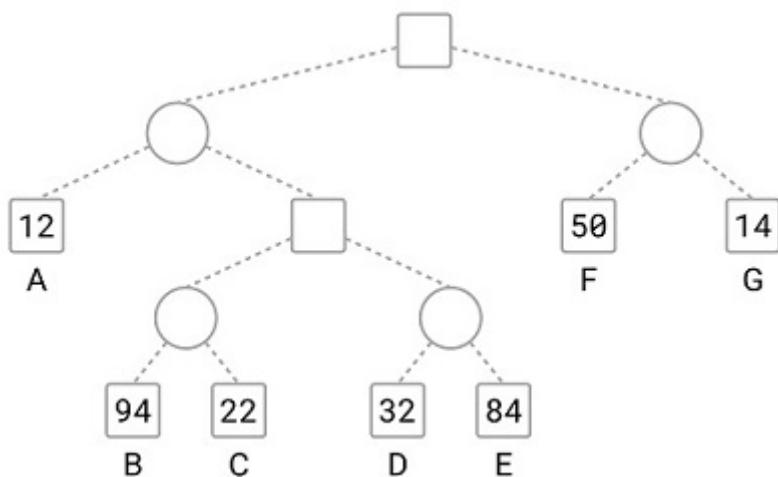
GAMES

The figure shows a game tree with evaluation function values at the horizon nodes.

The horizon nodes are labeled from A to G.

Use these labels to enter a horizon node or a list of horizon nodes in short answers (textbox).

Tie-breaker: when several nodes carry the same best cost then select the deepest node, if tie persists then select the leftmost of the deepest nodes to break the tie.



Based on the above data, answer the given subquestions.

Sub questions

Question Number : 58 Question Id : 640653614401 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Which of the following is a strategy for the MAX player?

Options :

6406532051025. ✘ A,F

6406532051026. ✘ A,B,D,F

6406532051027. ✓ A,D,E

6406532051028. ✘ B,D,F

Question Number : 59 Question Id : 640653614402 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Short Answer Question

List the horizon nodes in the best strategy for MAX. Enter the node labels in alphabetical order.

Enter a comma separated list of node labels in alphabetical order.

NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEOUS CHARACTERS.

Answer format: X,Y,Z

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

F,G

Question Number : 60 Question Id : 640653614403 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Short Answer Question

List the horizon nodes pruned by Alpha-Beta.

Enter a comma separated list of node labels in alphabetical order.

NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEous CHARACTERS.

Answer format: X,Y,Z

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

D,E

Question Number : 61 **Question Id :** 640653614404 **Question Type :** SA **Calculator :** None

Response Time : N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 1

Question Label : Short Answer Question

List the horizon nodes SOLVED by SSS*.

Enter a comma separated list of node labels in alphabetical order.

NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEous CHARACTERS.

Answer format: X,Y,Z

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

A,F,G

Sub-Section Number :	4
Sub-Section Id :	64065388899
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Id : 640653614405 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (62 to 64)

Question Label : Comprehension

PROBLEM DECOMPOSITION

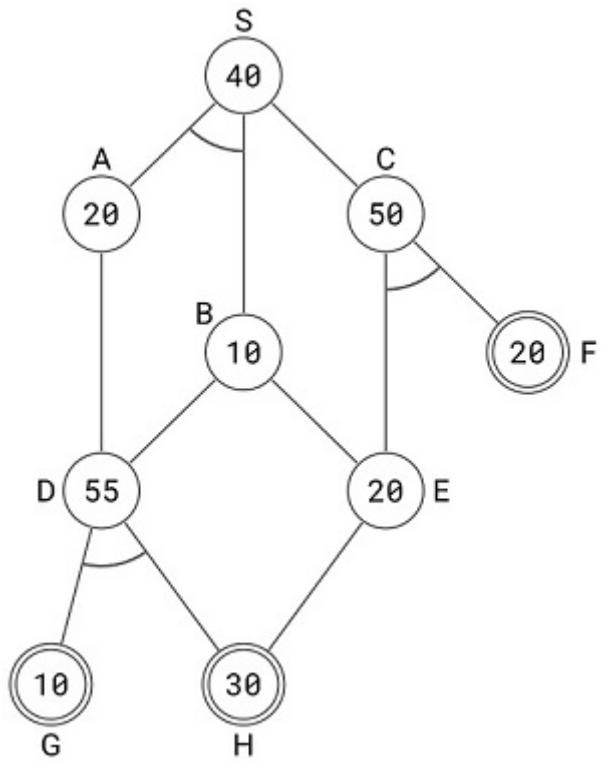
The figure shows an AND-OR graph that depicts how a problem S can be decomposed into one or more smaller problems. Nodes are uniquely identified by labels (S, A, B, ...). The number in each node is the heuristic estimate of the cost of solving that node.

Nodes shown in double lines are primitive nodes and their values are actual costs. Observe that a primitive node is added to the graph by its parent when the parent is expanded, and the primitive node is labeled as SOLVED and it will not be expanded subsequently.

The cost of each edge is 10 units.

Tie-breaker 1: If several nodes have the same cost then break the tie using node labels.

Tie-breaker 2: For AND nodes, expand the unsolved branch with the highest cost.



Use AO* algorithm to solve S, then answer the subquestions.

Sub questions

Question Number : 62 Question Id : 640653614406 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Short Answer Question

List the first three nodes (including S) expanded by AO* algorithm. List the nodes in the order they are expanded. Observe that primitive nodes are not expanded.

Enter a comma separated list of node labels.

NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEous CHARACTERS.

Answer format: X,Y,Z

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Set

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

S,A,C

A,C,E

Question Number : 63 Question Id : 640653614407 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Short Answer Question

Determine the value of the start node S after each node is expanded. What are the values of S after the 1st, 2nd and 3rd nodes are expanded, respectively? Enter the 3 values in the textbox.

Enter a comma separated list of numbers.

NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEous CHARACTERS.

Answer format: 12,42,17

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Set

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

50,60,70

60,70,90

Question Number : 64 Question Id : 640653614408 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Short Answer Question

What is the final value of the start node S?

Enter a number.

NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEous CHARACTERS.

Answer format: 42

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

90

Question Id : 640653614409 **Question Type :** COMPREHENSION **Sub Question Shuffling**

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

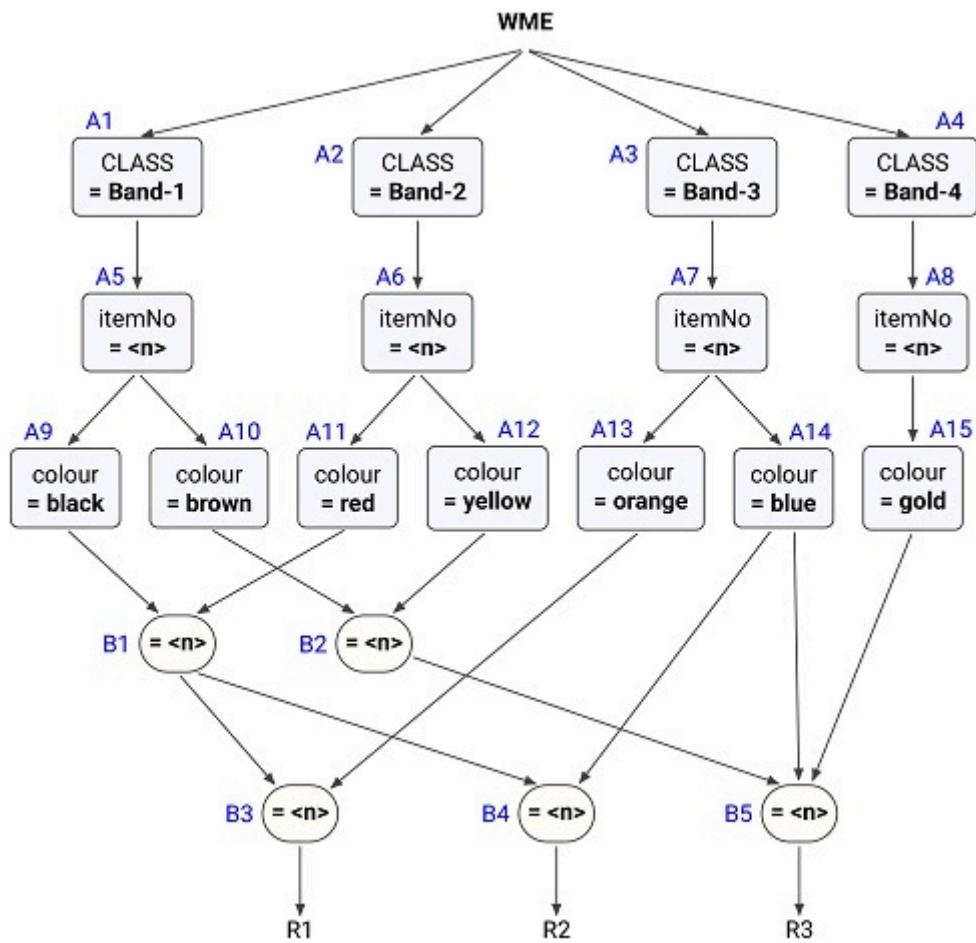
Calculator : None **Response Time :** N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Question Numbers : (65 to 67)

Question Label : Comprehension

RULE BASED EXPERT SYSTEMS

A small part of the Rete Net for classifying resistors is shown in the figure. The labels A1, A2, ..., A10, A11, ..., B1, ..., B5 uniquely identify the nodes in the network. When required, use the above label ordering to **break ties** and to enter short answers.



Run the Rete algorithm for the Working Memory shown below, the WMEs are in timestamp order. Assume that WMEs reside at appropriate Alpha nodes, and the Beta nodes point to WMEs residing in Alpha nodes.

101. (Band-1 ^itemNo 2B ^colour black)
102. (Band-1 ^itemNo 3C ^colour brown)
103. (Band-2 ^itemNo 1A ^colour red)
104. (Band-2 ^itemNo 2B ^colour yellow)
105. (Band-2 ^itemNo 3C ^colour yellow)
106. (Band-3 ^itemNo 2B ^colour blue)
107. (Band-3 ^itemNo 3C ^colour blue)
108. (Band-4 ^itemNo 3C ^colour gold)
109. (Band-3 ^itemNo 1A ^colour orange)
110. (Band-1 ^itemNo 1A ^colour black)

For each WME identify its location (node label) in the Rete Net, and prepare the conflict set for the first cycle, then answer the given subquestions.

Sub questions

Question Number : 65 Question Id : 640653614410 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following rule-data tuples are in the conflict-set?

Options :

6406532051035. ✓ R1,103,109,110

6406532051036. ✗ R2,101,103,106

6406532051037. ✓ R3,102,105,107,108

6406532051038. ✗ R3,101,104,106,108

Question Number : 66 Question Id : 640653614411 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

If the Inference Engine uses **Specificity** as the conflict resolution strategy then identify the rule-data tuple that will be ready to fire.

Options :

6406532051039. ✗ R1,103,109,110

6406532051040. ✗ R2,101,103,106

6406532051041. ✓ R3,102,105,107,108

6406532051042. ✗ R3,101,104,106,108

Question Number : 67 Question Id : 640653614412 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

If the Inference Engine uses **Recency** as the conflict resolution strategy then identify the rule-data tuples that will be ready to fire. If multiple rule-data tuples qualify then choose one.

Options :

6406532051043. ✓ R1,103,109,110

6406532051044. ✗ R2,101,103,106

6406532051045. ✗ R3,102,105,107,108

6406532051046. ✗ R3,101,104,106,108

Sub-Section Number : 5

Sub-Section Id : 64065388900

Question Shuffling Allowed : No

Is Section Default? : null

Question Id : 640653614413 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (68 to 71)

Question Label : Comprehension

AUTOMATED PLANNING

The domain description of a Blocks World with a single one-armed robot is given below.

PREDICATES

armEmpty	The arm is not holding any block, it is empty.
holding(X)	The arm is holding X.
onTable(X)	X is on the table.
clear(X)	X has nothing above it, it is clear.
on(X,Y)	X is directly placed on Y.

OPERATORS

Pickup(X): pick up X from the table.

Preconditions: { armEmpty, clear(X), onTable(X) }
Add Effects : { holding(X) }
Del Effects : { armEmpty, onTable(X) }

Putdown(X): place X on the table.

Preconditions: { holding(X) }
Add Effects : { armEmpty, onTable(X) }
Del Effects : { holding(X) }

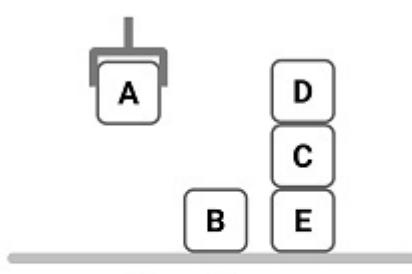
Unstack(X,Y): pick up X that is directly sitting on Y.

Preconditions: { armEmpty, clear(X), on(X,Y) }
Add Effects : { clear(Y), holding(X) }
Del Effects : { armEmpty, on(X,Y) }

Stack(X,Y): place X directly on top of Y.

Preconditions: { holding(X), clear(Y) }
Add Effects : { armEmpty, on(X,Y) }
Del Effects : { holding(X), clear(Y) }

Consider the planning problem with the following start state and goal description.



Start State

```
{ holding(A), on(D,C), on(C,E),
  onTable(B), onTable(E),
  clear(A), clear(B), clear(D) }
```



Goal Description

```
{ on(D,A), on(A,B), on(B,C) }
```

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 68 Question Id : 640653614414 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following are **applicable** actions in the start state?

Options :

6406532051047. ✓ Putdown(A)

6406532051048. ✓ Stack(A,B)

6406532051049. ✗ Stack(B,C)

6406532051050. ✓ Stack(A,D)

6406532051051. ✗ Stack(D,A)

Question Number : 69 Question Id : 640653614415 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following are **relevant** actions in the goal state?

Options :

6406532051052. ❌ Putdown(A)

6406532051053. ✓ Stack(A,B)

6406532051054. ✓ Stack(B,C)

6406532051055. ❌ Stack(A,D)

6406532051056. ✓ Stack(D,A)

Question Number : 70 Question Id : 640653614416 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Max. Selectable Options : 0

Question Label : Multiple Select Question

In the planning graph, which of the following are mutex action pairs in Layer 1?

Options :

6406532051057. ✓ Stack(A,B), Putdown(A)

6406532051058. ✓ Stack(A,D), Putdown(A)

6406532051059. ✓ Stack(A,B), Stack(A,D)

6406532051060. ❌ Pickup(B), Putdown(A)

6406532051061. ❌ Unstack(D,C), Putdown(A)

Question Number : 71 Question Id : 640653614417 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Max. Selectable Options : 0

Question Label : Multiple Select Question

In the planning graph, which of the following are mutex proposition pairs in Layer 1?

Options :

6406532051062. ✗ clear(B), holding(A)

6406532051063. ✗ onTable(B), on(A,B)

6406532051064. ✓ onTable(A), on(A,B)

6406532051065. ✓ on(A,D), on(A,B)

Sub-Section Number : 6

Sub-Section Id : 64065388901

Question Shuffling Allowed : No

Is Section Default? : null

Question Id : 640653614418 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

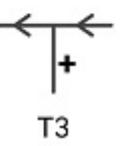
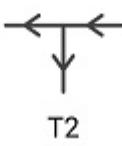
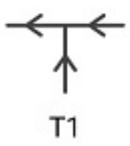
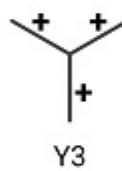
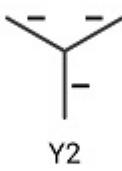
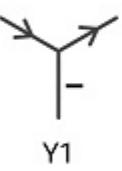
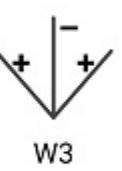
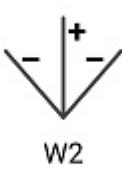
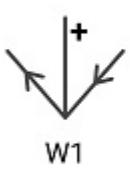
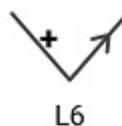
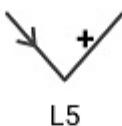
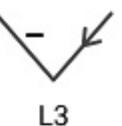
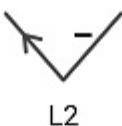
Question Numbers : (72 to 73)

Question Label : Comprehension

CONSTRAINT SATISFACTION

The set of junctions (L, W, Y and T type junctions) that occur in a 2D line drawing of trihedral objects is provided below. The in-plane clockwise/counterclockwise rotations of these junctions are valid as well. These junctions provide constraints on the possible edge assignments (convex, concave, arrow) for the edges/lines in 2D line drawings of trihedral objects.

The junctions carry unique labels: L1, L2, L3, L4, L5, L6, T1, T2, T3, T4, W1, W2, W3, Y1, Y2, Y3. When required, use the labels in short answers.



Note: A 2D line drawing of trihedral objects is considered to be consistent if all the edges and junctions can be assigned labels that are consistent with each other, otherwise the drawing is considered to be inconsistent and all labels are reset to NIL.

Apply a suitable algorithm to assign consistent labels to edges/junctions in the 2D line drawings in the sub-questions. Choose a suitable edge and junction order for solving the problems.

Sub questions

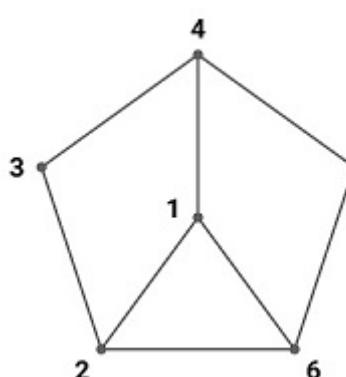
Question Number : 72 Question Id : 640653614419 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Short Answer Question

Assign consistent labels to all the edges and junctions in the 2D line drawing shown below. Enter the labels of the junctions 1, 2, 3, 4 in the text box, in that order. Or enter NIL if the drawing has no consistent label assignment.



Enter a comma separated list of junction labels, or enter NIL.

NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEous CHARACTERS.

Answer format: X9,Y9,Z9,W9

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Set

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

Y3,W1,L1,W1

Y3,W1,L3,W3

Y3,W2,L2,W1

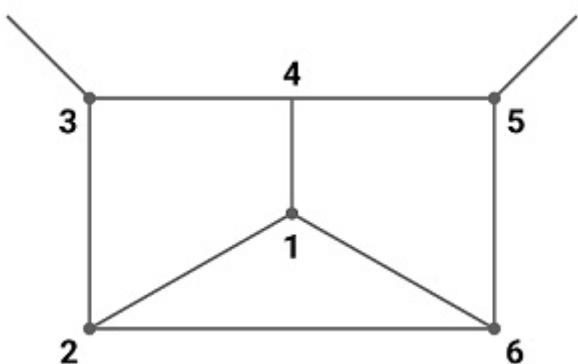
Question Number : 73 **Question Id :** 640653614420 **Question Type :** SA **Calculator :** None

Response Time : N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 1

Question Label : Short Answer Question

Assign consistent labels to all the edges and junctions in the 2D line drawing shown below. Enter the labels of the junctions 1, 2, 3, 4 in the text box, in that order. Or enter NIL if the drawing has no consistent label assignment.



Enter a comma separated list of junction labels, or enter NIL.

NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEous CHARACTERS.

Answer format: X9,Y9,Z9,W9

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

NIL

Deep Learning

Section Id : 64065341427

Section Number : 4

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 : Yes

Maximum Instruction Time : 0

Sub-Section Number : 1

Sub-Section Id : 64065388902

Question Shuffling Allowed : No

Is Section Default? : null

Question Number : 74 Question Id : 640653614421 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : DEEP LEARNING (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 :

6406532051068. ✓ YES

6406532051069. ✘ NO

Sub-Section Number : 2

Sub-Section Id : 64065388903

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 75 Question Id : 640653614422 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Which of the following threshold θ value of MP neuron implements AND Boolean function denoted by $f(\mathbf{x})$? Assume that the number of inputs x_i to the neuron is seven and the neuron does not have any inhibitory inputs.

$$f(\mathbf{x}) = \begin{cases} 1, & \text{if } \sum_{i=0}^6 x_i > \theta \\ 0, & \text{otherwise} \end{cases}$$

Options :

6406532051070. ✘ 0

6406532051071. ✘ -6

6406532051072. ✓ 6

6406532051073. ✘ 7

6406532051074. ✘ -7

Question Number : 76 Question Id : 640653614441 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Consider the statement “the attention mechanism in RNN based Encoder- Decoder architecture helps the decoder to understand the context of words in a given sentence”. The statement is

Options :

6406532051111. ✓ True

6406532051112. ✘ False

Sub-Section Number : 3

Sub-Section Id : 64065388904

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 77 Question Id : 640653614423 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Suppose that MP neuron takes in 7 Boolean inputs (x_0, \dots, x_6) and produces the Boolean output y . Assume none of the inputs is inhibitory. Select all true statements

Options :

6406532051075. ✓ There are 2^{2^7} possible Boolean functions

6406532051076. ✗ There are 2^7 possible Boolean functions

6406532051077. ✓ The function $y = \min(x_0, \dots, x_6)$ is linearly separable

6406532051078. ✗ The function $y = \min(x_0, \dots, x_6)$ is not linearly separable

Question Number : 78 Question Id : 640653614432 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Suppose that we have a deep Feed Forward Fully Connected Neural Network. The network is observed to have a high variance. Then, which of the following techniques regularize the parameter of the network to reduce the high variance ?

Options :

6406532051093. ✓ Adding L_2 norm of weights to the loss function

6406532051094. ✓ Adding a noise to the input samples

6406532051095. ✓ Adding a noise to the output prediction

6406532051096. ✓ Adding more samples to the dataset by augmenting existing samples using some augmentation techniques

6406532051097. ✘ Dropping hidden layers in a neural network randomly during training

Sub-Section Number : 4

Sub-Section Id : 64065388905

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 79 Question Id : 640653614424 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

The logistic sigmoid function is defined as follows,

$$f(x) = \frac{1}{1 + \exp(-(wx + b))}$$

The parameters are initialized to $w = 1$ $b = 1$. Suppose the loss is defined as

$$L = \frac{1}{2}(f(x) - y)^2$$

where y is the true value. Compute the gradient of b for the following sample
 $x = 0.2, y = 0.$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.024 to 0.029

Question Number : 80 Question Id : 640653614429 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Consider a training set that contains 10 samples to train a neural network.

Further, mini-batch GD algorithm has been chosen to update the parameters of the network with a batch size of 2. Suppose that we use an exponentially decaying learning rate scheme $\eta_t = 2 \exp(-\frac{t}{4})$ and train the model for 2 epochs. What will be the value of the learning rate η_t at the end of the training? Assume, t starts from zero.

Enter the answer to 3 decimal points (that is, if your answer is -0.12145, then enter it as -0.121)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.19 to 0.23

Question Number : 81 Question Id : 640653614433 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Consider an input image of size $256 \times 256 \times 3$, where 3 is the number of channels.

Suppose we apply a set of convolution kernels on the input image that generates the output feature maps of size $248 \times 248 \times 32$. How many parameters (including bias) do the kernels have? Assume stride ($s = 1$) and padding $p = 1$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

11648

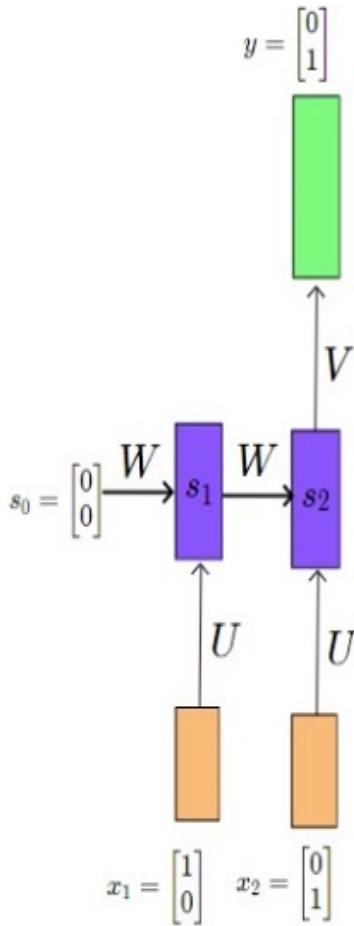
Question Number : 82 Question Id : 640653614440 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Consider a simple RNN for a binary sequence classification problem.



Suppose the weight matrices U, V, W are initialized as follows

$$W = U = V = \begin{bmatrix} -1 & 1 \\ 1 & -1 \end{bmatrix}$$

The state vector s_t is computed as follows

$$s_t = \tanh(Ux_t + Ws_{t-1})$$

What is the loss value? Use cross entropy loss with natural logarithm.

Note: In all your calculations, consider only the first two decimal places of any number (such as inputs, intermediate results..). That is, if the number is -1.0234, take it as -1.02.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.12 to 0.26

Sub-Section Number : 5

Sub-Section Id : 64065388906

Question Shuffling Allowed : No

Is Section Default? : null

Question Id : 640653614425 Question Type : COMPREHENSION Sub Question Shuffling

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

Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (83 to 85)

Question Label : Comprehension

Consider a fully connected feed forward neural network with 3 hidden layers. The weight matrix W_1 connecting the input layer to the first hidden layer is of shape 20×150 , similarly the shape of other weight matrices are as follows $W_2 : 150 \times 100$, $W_3 : 100 \times 10$, and the weight W_4 connecting the final hidden layer and the output layer is of shape 10×3 . The network solves the multi-class classification problem by using the cross entropy loss function. Moreover, the labels are one hot encoded.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 83 Question Id : 640653614426 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Short Answer Question

How many neurons are there in the network. Every neuron in the network has bias associated with it?

Note: A neuron is a computation unit that takes in some inputs and produce an output.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

263

Question Number : 84 Question Id : 640653614427 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Short Answer Question

How many learnable parameters (including bias) does the network have? Assume dropout regularization is applied.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

19293

Question Number : 85 Question Id : 640653614428 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

For the given neural network configuration, we can replace the output layer with softmax activation by logistic sigmoid and still use cross entropy loss. The statement is

Options :

6406532051082. ✘ True

6406532051083. ✓ False

Question Id : 640653614434 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (86 to 87)

Question Label : Comprehension

Consider a sentence inside the quote “I may be wrong, and you may be right, and by an effort, we may get nearer to the truth”

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 86 Question Id : 640653614435 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Short Answer Question

What is the size of the vocabulary, $|V|$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

16

Question Number : 87 Question Id : 640653614436 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Suppose all words in the vocabulary are represented using one-hot-encoded vector of size $|V|$. Then compute the ordered pair-wise (that is, Cartesian product of $V \times V$) cosine similarity between word representations and enter their sum.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

16

Sub-Section Number : 6

Sub-Section Id : 64065388907

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 88 **Question Id :** 640653614430 **Question Type :** MCQ **Is Question**

Mandatory : No **Calculator :** None **Response Time :** N.A **Think Time :** N.A **Minimum Instruction**

Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

The update rule for the ADAM (Adaptive Moments) optimization algorithm is given below,

$$\begin{aligned}m_t &= \beta_1 m_{t-1} + (1 - \beta_1) \nabla w_t \\v_t &= \beta_2 v_{t-1} + (1 - \beta_2) (\nabla w_t)^2 \\w_{t+1} &= w_t - \frac{\eta}{\sqrt{v_t} + \epsilon} \hat{m}_t\end{aligned}$$

Here, $0 \leq \beta_1 < 1$ and $0 \leq \beta_2 < 1$ and t starts from zero (that is, $t = 0, 1, 2, \dots$). Both m_t and v_t are initialized to zero. However, the update rule uses the bias corrected version of m_t and v_t . Which of the following is the bias corrected version of m_t ?

Helper:

$$m_t = (1 - \beta_1) \sum_{\tau=0}^t \beta_1^{t-\tau} \nabla w_\tau$$

and assume that $E[\nabla w_\tau] = E[\nabla w] \quad \forall \tau$, if required.

Options :

6406532051085. ❌ $\hat{m}_t = \frac{m_t}{1 - \beta_1^t}$

6406532051086. ✓ $\hat{m}_t = \frac{m_t}{1 - \beta_1^{t+1}}$

6406532051087. ❌ $\hat{m}_t = m_t$

6406532051088. ❌ $\hat{m}_t = \frac{m_t}{1 - t \beta_1^t}$

Sub-Section Number : 7

Sub-Section Id : 64065388908

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 89 Question Id : 640653614431 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Consider a target variable $y = f(x) + \epsilon$ that is related to x , where ϵ is a random variable (noise) distributed normally. About 1000 points are sampled from the true function $f(x)$ to form a training set. Suppose that a prediction model $\hat{f}(x)$ is sufficiently complex in that $f(x) \subset \hat{f}(x)$. Then, the statement that the training error is lower bounded by σ^2 (that is, the variance of the noise) is

Options :

6406532051089. ❌ True, due to the presence of noise in the target

6406532051090. ❌ True, due to the high variance of the prediction model

6406532051091. ✓ False, due to the high variance of the prediction model

6406532051092. ❌ False, due to zero mean of the noise added to the target

Sub-Section Number : 8

Sub-Section Id : 64065388909

Question Shuffling Allowed : No

Is Section Default? : null

Question Id : 640653614437 Question Type : COMPREHENSION Sub Question Shuffling

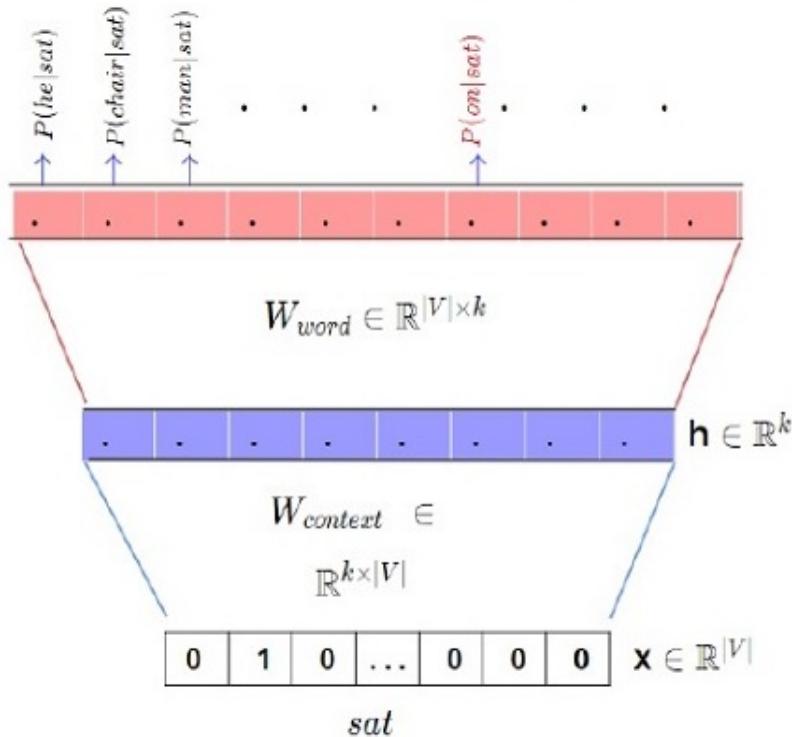
Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (90 to 91)

Question Label : Comprehension

Consider a model shown below that learns the distributed vector representation of words by learning to predict the target word v_w given the context word u_c . Here, v_w and u_c are the vector representation of target word at index w of the output vocabulary and context word at index c of the input vocabulary, respectively.



In the diagram, $|V|$ denotes the size of the vocabulary, $W_{context}$ and W_{word} are learnable parameters. The vector representation of all context words are arranged as columns of $W_{context}$ and the vector representation for all target words are arranged as row vectors in W_{word} . The parameters are initialized randomly. The input x is one-hot-representation of a word in the input vocabulary. Assume that the size of both input and output vocabulary are equal.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 90 Question Id : 640653614438 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

Suppose the input is x (one hot representation of context word) and the corresponding label is y (one hot representation of target word).

The quantities h, u_c, \hat{y} are computed as follows,

$$h = u_c = W_{context} x, \quad z = W_{word} u_c \quad \hat{y} = softmax(z)$$

Choose the expression that the model has to minimize using cross entropy loss (Assume natural logarithm where required).

Options :

6406532051101. ✓ $-v_w u_c + \log \left(\sum_{w' \in V} \exp(v_{w'} u_c) \right)$

6406532051102. ✗ $-u_c v_w^T + \log \left(\sum_{w' \in V} \exp(u_c v_{w'}^T) \right)$

6406532051103. ✗ $-u_c v_w^T - \log \left(\sum_{w' \in V} \exp(u_c v_{w'}^T) \right)$

6406532051104. ✗ $-v_w^T u_c - \log \left(\sum_{w' \in V} \exp(v_{w'}^T u_c) \right)$

Question Number : 91 Question Id : 640653614439 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5 Max. Selectable Options : 0

Question Label : Multiple Select Question

Suppose we compute the gradients and update the representations with $\eta = 1$. Choose the correct statement(s)

Options :

Suppose the model predicts target word v_w with probability score of 1 (that is, $\hat{y}_w = 1$). Then no elements in v_w will get modified after one iteration (i.e, parameter update).

6406532051105. ✓

Suppose the model predicts target word v_w with probability score of 1 (that is, $\hat{y}_w = 1$). Then no elements in $v_{w'}, (w' \neq w)$ will get modified after one iteration (i.e, parameter update).

6406532051106. ✓

Suppose the model predicts target word v_w with probability score of 0.5 (that is, $\hat{y}_w = 0.5$). Then the elements

6406532051107. ✓ of v_w will be modified as $v_w = v_w + 0.5u_c^T$

Suppose the model predicts target word v_w with probability score of 0.5 (that is, $\hat{y}_w = 0.5$). Then the elements of $v_{w'}$ will be modified as

6406532051108. ✓

Suppose the model predicts target word v_w with probability score of 0.5 (that is, $\hat{y}_w = 0.5$). Then the elements of $v_{w'}$ will be modified as $v_{w'} = v_{w'} + \hat{y}_{w'} u_c^T$

6406532051109. ✗

SPG

Section Id :	64065341428
Section Number :	5
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	33
Number of Questions to be attempted :	33
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 :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	64065388910
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 92 Question Id : 640653614442 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : STRATEGIES FOR PROFESSIONAL GROWTH (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 :

6406532051113. ✓ YES

6406532051114. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 64065388911

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 93 Question Id : 640653614443 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Short Answer Question

Answer the question in about 100-150 words. Ensure your answers are supported with content from the course and/or suitable examples.

Briefly outline the key components of Daniel Goleman's Emotional Intelligence (EI) model and their relevance in managing emotions in the workplace.

Response Type : Alphanumeric

Evaluation Required For SA : No

Max Word Count : 150

Show Word Count : Yes

Min Word Count : 0

Highlight min word : Yes

Single Line Response : No

Number of Rows : 10

Number Of Columns : 70

Text Areas : PlainText

Question Number : 94 Question Id : 640653614444 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Short Answer Question

Answer the question in about 100-150 words. Ensure your answers are supported with content from the course and/or suitable examples.

How does the "6R Framework of Emotional Intelligence (EI)", described in the *Strategies for Professional Growth* course differ from or align with Daniel Goleman's EI model?

Response Type : Alphanumeric

Evaluation Required For SA : No

Max Word Count : 150

Show Word Count : Yes

Min Word Count : 0

Highlight min word : Yes

Single Line Response : No

Number of Rows : 10

Number Of Columns : 70

Text Areas : PlainText

Sub-Section Number : 3

Sub-Section Id : 64065388912

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 95 Question Id : 640653614445 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Which management 'guru' implied that the difference between successful and unsuccessful

companies is their ability to learn?

Options :

6406532051117. ✘ Malcolm Gladwell

6406532051118. ✘ Michael Porter

6406532051119. ✓ Peter Senge

6406532051120. ✘ Max Weber

Question Number : 96 Question Id : 640653614446 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Caselet: Nivedita, an HR manager, closely observes how professional relationships impact productivity and job satisfaction in the evolving office environment. With remote work on the rise, virtual communication has replaced in-person interactions among her colleagues, altering the dynamics of workplace connections. Nivedita highlights the need to assess internal factors shaping interactions for fostering successful working relationships, without solely blaming external factors for any dip in productivity.

Which *Systems Thinking* habit is exemplified by the Nivedita in this scenario?

Options :

6406532051121. ✘ Seeks to understand the bigger picture.

6406532051122. ✘ Observes how elements in the system change over time.

6406532051123. ✓ Recognizes systems structure generates its behaviour.

6406532051124. ✘ Recognizes meaningful connections within and between systems.

Question Number : 97 Question Id : 640653614447 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Caselet: Tejas, a manager at a software company, believes in the power of systems thinking to enhance his team's performance. He implements the concept of "Check results and change actions if needed" in his approach. He also encourages his team to regularly evaluate the outcomes of their projects before making any adjustments to their strategies. He emphasizes the importance of learning from the results and iteratively refining their actions to achieve optimal results.

What *Systems Thinking* habit is Tejas applying in his managerial approach?

Options :

6406532051125. ❌ Seeking to understand the bigger picture.

6406532051126. ❌ Outcome-based tactics.

6406532051127. ❌ Recognizing systems structure generates its behaviour.

6406532051128. ✓ Successive approximation.

Question Number : 98 Question Id : 640653614448 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

In problem-solving, what defines whether a system is open or closed?

Options :

6406532051129. ✓ System boundaries

6406532051130. ❌ System cost

6406532051131. ❌ System hierarchy

6406532051132. ❌ System availability

Question Number : 99 Question Id : 640653614449 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

A system must consist of three kinds of things: 1. ____, 2. Function or purpose of the system and 3. Interconnectedness or interaction between them.

Options :

6406532051133. ❌ Cogs and gears

6406532051134. ✓ Elements or parts

6406532051135. ❌ Hierarchy or order

6406532051136. ❌ People or persons

Question Number : 100 Question Id : 640653614450 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

In the *Engineering Sense* context, which management function involves the process of foreseeing potential issues, analyzing them, estimating their probable impact, and determining actions that will guide the achievement of desired outcomes and goals?

Options :

6406532051137. ✓ Planning

6406532051138. ❌ Leading

6406532051139. ❌ Controlling

6406532051140. ❌ Organizing

Question Number : 101 Question Id : 640653614451 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

In the *Engineering Sense* context, why are accurate estimates critical to effective project management?

1. Estimates are needed to support good decisions.
2. Estimates are needed to determine the project's length and cost.
3. Estimates are needed to determine whether the project is worth doing.
4. Estimates are needed to develop cash flow needs.
5. Estimates are needed to determine how well the project is progressing.

Select the correct options:

Options :

6406532051141. ✘ 1, 2, 3 and 4 only

6406532051142. ✘ 2, 3, 4 and 5 only

6406532051143. ✘ 1, 2, 3, and 5 only

6406532051144. ✓ 1, 2, 3, 4, and 5

Question Number : 102 Question Id : 640653614452 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

With regards to *Engineering Sense*, consider the following about Cost Analysis

1. It involves a theoretical study of the total cost of producing a given product.
2. It serves as a method for identifying components' costs that should undergo design analysis.

Which of the statement(s) given above is/are correct?

Options :

6406532051145. ✘ 1 only

6406532051146. ✘ 2 only

6406532051147. ✓ Both 1 and 2

6406532051148. ✘ Neither 1 nor 2

Question Number : 103 Question Id : 640653614453 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

With regards to *Engineering Sense*, consider the following about Mental Models

1. It is based on belief, not facts.
2. It is considerably rigid in positive as well as in negative sense.

Which of the statement(s) given above is/are correct?

Options :

6406532051149. ✓ 1 only

6406532051150. ✘ 2 only

6406532051151. ✘ Both 1 and 2

6406532051152. ✘ Neither 1 nor 2

Question Number : 104 Question Id : 640653614454 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Which category includes the intrinsic desire for personal development and the aspiration for self-esteem, self-confidence, and self-actualization needs such as morality, creativity, problem-solving, and discovery?

Options :

6406532051153. ❌ Existence needs

6406532051154. ❌ Relatedness needs

6406532051155. ✓ Growth needs

6406532051156. ❌ Physiological needs

Question Number : 105 Question Id : 640653614455 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Which of the following statements contradicts the principles of *Growth Mindset*?

Options :

6406532051157. ❌ If I dedicate time each day to learning a new skill, I can gradually improve my abilities over time.

6406532051158. ❌ Although I failed this time, I can analyze my mistakes and learn from them to perform better next time.

6406532051159. ✓ I'm naturally not good at this task, so there's no point in trying to get better at it.

6406532051160. ❌ Receiving constructive feedback is essential for my personal growth, so I should actively seek it out from peers and mentors.

Question Number : 106 Question Id : 640653614456 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Which non-fiction book focused on the concept of growth mindset was written by Carol Dweck, an American psychologist specializing in motivation and mindset research?

Options :

6406532051161. ✘ Achieving Excellence Through Growth Mindset

6406532051162. ✘ Mindset: Thinking, Fast and Slow

6406532051163. ✓ Mindset: The New Psychology of Success

6406532051164. ✘ Mindset: Why It Can Matter More Than IQ

Question Number : 107 Question Id : 640653614457 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Which of the following elements collectively constitute culture?

1. Beliefs
2. Attitudes
3. Values
4. Assumptions
5. Shared ways of doing things

Select the correct option:

Options :

6406532051165. ✘ 1, 2, and 3 only

6406532051166. ✘ 2, 3, and 4 only

6406532051167. ✘ 1, 3, and 5 only

6406532051168. ✓ 1, 2, 3, 4, and 5

Question Number : 108 Question Id : 640653614458 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

In Asian cultures, publicly rewarding a specific employee's performance might be seen poorly by the employee and others because of which cultural dimension?

Options :

6406532051169. ✘ Power Distance

6406532051170. ✘ Uncertainty Avoidance

6406532051171. ✘ Femininity vs. Masculinity

6406532051172. ✓ Individualism vs. Collectivism

Question Number : 109 Question Id : 640653614459 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Caselet: Imagine a global technology company that operates across various continents, with its headquarters in Germany and regional offices in India and Brazil. The German office follows a structured and hierarchical approach to decision-making, while the Indian office values flexibility and adaptability, and the Brazilian office promotes a relaxed and open work environment. As the company expands its operations and teams from different offices collaborate on projects, it becomes apparent that their diverse cultural backgrounds are leading to challenges in understanding each other's work methods and communication styles. Recognizing the potential of combining their strengths, the teams decide to come together to create a new project

management approach that incorporates elements from each office's culture, concepts and skills.

In the given scenario, how did the teams from different offices aim to address the challenges posed by their diverse cultural backgrounds?

Options :

6406532051173. ❌ Cultural accommodation

6406532051174. ✓ Cultural synergy

6406532051175. ❌ Cultural assimilation

6406532051176. ❌ Cultural compromise

Question Number : 110 Question Id : 640653614460 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

During a permanent overseas assignment, an individual initially experiences excitement about the new environment but eventually becomes frustrated due to differences in culture and communication. This frustration leads to a sense of isolation and doubts about their abilities. Subsequently, they start adapting and regaining confidence in their ability to function within the new culture. What is this phenomenon called?

Options :

6406532051177. ❌ Parochialism

6406532051178. ❌ Collectivism

6406532051179. ❌ Ethnocentrism

6406532051180. ✓ Acculturation

Question Number : 111 Question Id : 640653614461 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

State whether the following statement is True or False:

"According to the modern revised understanding of Maslow's hierarchy of needs, to progress to a higher level, it is NOT essential that the needs at the lower levels are completely fulfilled."

Options :

6406532051181. ✓ TRUE

6406532051182. ✗ FALSE

Question Number : 112 Question Id : 640653614462 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

With regards to *Creativity*, consider the following about Deprivation Sensitivity

1. In deprivation sensitivity, you seek to solve problems and close gaps, and you cannot rest until the puzzle has been solved.

2. The emotional tone of deprivation sensitivity is the same as that of joyous exploration.

Which of the statement(s) given above is/are correct?

Options :

6406532051183. ✓ 1 only

6406532051184. ✗ 2 only

6406532051185. ✗ Both 1 and 2

6406532051186. ✗ Neither 1 nor 2

Question Number : 113 Question Id : 640653614463 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

State whether the following statement is True or False:

"According to Goal-setting theory, difficult specific goals lead to significantly higher performance than easy goals, no goals, or even the setting of an abstract goal such as urging people to do their best."

Options :

6406532051187. ✓ TRUE

6406532051188. ✗ FALSE

Question Number : 114 Question Id : 640653614464 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

State whether the following statement is True or False:

"Stress itself is not negative - it is unresolved or constant stress beyond a threshold that starts to have unhealthy effects on us."

Options :

6406532051189. ✓ TRUE

6406532051190. ✗ FALSE

Question Number : 115 Question Id : 640653614465 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Which personality dimension includes attributes associated with the inclination for dominance and extraversion in the context of leadership?

Options :

6406532051191. ❌ Conscientiousness

6406532051192. ✓ Surgency

6406532051193. ❌ Agreeableness

6406532051194. ❌ Neuroticism

Question Number : 116 Question Id : 640653614466 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

The Leadership Grid, formulated by Blake and Mouton, derives from a leader's dual considerations of people and production. The style denoted by the (1, 9) grid, is also recognized as _____.

Options :

6406532051195. ❌ Produce or perish style

6406532051196. ❌ Team style

6406532051197. ✓ Country club style

6406532051198. ❌ Middle-of-the-road style

Question Number : 117 Question Id : 640653614467 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Consider the following pairs:

1. Intrapersonal Intelligence: Ability to interact effectively with others
2. Interpersonal Intelligence: Sensitivity to one's own feelings, goals, and anxieties
3. Naturalistic Intelligence: Ability to recognize and understand the various patterns in nature
4. Spatial Intelligence: Capacity to perceive, understand and use visual information effectively

Which of the pairs given above is/are correctly matched?

Options :

6406532051199. ✘ 1, 2 and 3 only

6406532051200. ✘ 1 and 2 only

6406532051201. ✓ 3 and 4 only

6406532051202. ✘ 1, 3 and 4 only

Question Number : 118 Question Id : 640653614468 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Which principle does the acronym TEAM (Together Everyone Achieves More) emphasize?

Options :

6406532051203. ✘ Individually-driven goal achievement.

6406532051204. ✘ Prioritizing the organization over individual employee(s).

6406532051205. ✓ The significance of teamwork within the workplace.

6406532051206. ✘ Disregarding the input of employees.

Question Number : 119 Question Id : 640653614469 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

State whether the following statement is True or False:

According to Tuckman's Team & Group Development Model, the effectiveness of groups falls from what it was during the forming stage, as it enters the storming stage. Thereafter performance and effectiveness rise steadily through the norming and performing stages.

Options :

6406532051207. ✓ TRUE

6406532051208. ✗ FALSE

Question Number : 120 Question Id : 640653614470 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

A ____ is a trust that pools the savings of a number of investors who share common financial goals.

Options :

6406532051209. ✗ Options

6406532051210. ✓ Mutual Funds

6406532051211. ✗ Government Securities

6406532051212. ✗ Derivatives

Question Number : 121 Question Id : 640653614471 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Which of the following factors contribute to the benefit of economies of scale for Mutual funds?

1. Large volumes of trade
2. Portfolio diversification
3. Risk reduction
4. Loss

Select the correct option:

Options :

6406532051213. ✘ 1 and 3 only

6406532051214. ✘ 1, 3 and 4 only

6406532051215. ✘ 2, 3 and 4 only

6406532051216. ✓ 1, 2 and 3 only

Question Number : 122 Question Id : 640653614472 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

When there is an excess of funds chasing a limited supply of goods, the likely outcome of inflation is known as

Options :

6406532051217. ✘ Deflation

6406532051218. ✘ Cost-push inflation

6406532051219. ✘ Stagflation

6406532051220. ✓ Demand-pull inflation

Question Number : 123 Question Id : 640653614473 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Ritik invested Rs.1,00,000 in a bank fixed deposit for one year. After a year, he received 10% interest on his fixed deposit. If he is required to pay 30% tax on his returns, what are his tax-adjusted returns?

Options :

6406532051221. ✓ Rs. 7,000

6406532051222. ✗ Rs. 10,000

6406532051223. ✗ Rs. 3,000

6406532051224. ✗ Rs. 13,000

Question Number : 124 Question Id : 640653614474 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

In a conference call with a dozen people, Mehak leads the group through a list of seven important actions that must be undertaken immediately. After she finishes describing each action, she moves on to the next without delay. Once she has covered all seven, she gives a gracious conclusion and ends the call. Mehak later receives emails from several participants with questions. Her presentation resulted in no questions during the conference but many questions afterwards. What was missing in Mehak's presentation?

1. Her style did not accommodate feedback in an effective way.
2. Her style did not use enough repetition so participants could keep up with her and recall what she did.
3. Her style did not include the time and space her audience needed to absorb the content she

presented.

Which of the statement(s) given above is/are correct?

Options :

6406532051225. ✘ 1 and 3 only

6406532051226. ✘ 2 only

6406532051227. ✘ 1 and 2 only

6406532051228. ✓ 1, 2 and 3

Market Research

Section Id :	64065341429
Section Number :	6
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	4
Number of Questions to be attempted :	4
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 :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	64065388913
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 125 Question Id : 640653614475 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : MARKET RESEARCH (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 :

6406532051229. ✓ YES

6406532051230. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 64065388914

Question Shuffling Allowed : No

Is Section Default? : null

Question Id : 640653614476 Question Type : COMPREHENSION Sub Question Shuffling

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

Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (126 to 132)

Question Label : Comprehension

Given below are the results from a brand health study. The data shown here is in column percentages. Please use the data and answer the given subquestions.

	TOM	Unaided	Total Aware	Brands Ever used	Current brand
Brand A	3%	11%	29%	10%	3%
Brand B	0%	1%	19%	4%	1%
Brand C	2%	13%	51%	9%	7%
Brand D	55%	82%	97%	80%	77%
Brand E	12%	45%	85%	30%	25%
Brand F	18%	47%	84%	43%	32%
Brand G	0%	1%	18%	3%	1%
Brand H	3%	16%	55%	11%	4%
Brand I	1%	3%	21%	6%	1%
Brand J	0%	0%	4%	18%	0%

Sub questions

Question Number : 126 Question Id : 640653614477 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Which brand has the highest gap between unaided and total awareness?

Options :

6406532051231. ❌ Brand A

6406532051232. ❌ Brand B

6406532051233. ❌ Brand C

6406532051234. ❌ Brand D

6406532051235. ✓ Brand E

6406532051236. ❌ Brand F

6406532051237. ❌ Brand G

6406532051238. ❌ Brand H

6406532051239. ❌ Brand I

6406532051240. * Brand J

Question Number : 127 Question Id : 640653614478 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Short Answer Question

What is the trial to total awareness ratio for Brand A?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.33 to 0.35

Question Number : 128 Question Id : 640653614479 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Short Answer Question

What is the trial to total awareness ratio for Brand C?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.17 to 0.19

Question Number : 129 Question Id : 640653614480 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Short Answer Question

What is the lapsing ratio for Brand E?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.16 to 0.18

Question Number : 130 Question Id : 640653614481 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Short Answer Question

What is the lapsing ratio for Brand F?

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 : 131 Question Id : 640653614482 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

Which brand has the highest adoption ratio?

Options :

6406532051245. ✘ Brand A

6406532051246. ✘ Brand B

6406532051247. ✘ Brand C

6406532051248. ✓ Brand D

6406532051249. ✘ Brand E

6406532051250. ✘ Brand F

6406532051251. ✘ Brand G

6406532051252. ✘ Brand H

6406532051253. ✘ Brand I

6406532051254. ✘ Brand J

Question Number : 132 Question Id : 640653614483 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

Which brand has the lowest adoption ratio?

Options :

6406532051255. ✘ Brand A

6406532051256. ✘ Brand B

6406532051257. ✘ Brand C

6406532051258. ✘ Brand D

6406532051259. ✘ Brand E

6406532051260. ✘ Brand F

6406532051261. ✘ Brand G

6406532051262. ✘ Brand H

6406532051263. ✘ Brand I

6406532051264. ✓ Brand J

Sub-Section Number : 3

Sub-Section Id : 64065388915

Question Shuffling Allowed : No

Is Section Default? : null

Question Id : 640653614484 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (133 to 137)

Question Label : Comprehension

Please see the situations and indicate which significance test is appropriate in the given subquestions.

Sub questions

Question Number : 133 Question Id : 640653614485 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Comparison of the mean income of a group of engineers before and after they clear a special training module customized to their industry

Options :

6406532051265. ✘ T test for means, independent samples

6406532051266. ✓ T test for means, dependent samples

6406532051267. ✘ Z test for proportions

6406532051268. ✘ ANOVA

6406532051269. ✘ Chi square

Question Number : 134 Question Id : 640653614486 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Comparison of the average monthly walk-ins for 6 different outlets over a 3 month period. Each outlet is located in a different area where the profile of consumers varies from area to area

Options :

6406532051270. ✘ T test for means, independent samples

6406532051271. ✘ T test for means, dependent samples

6406532051272. ✘ Z test for proportions

6406532051273. ✓ ANOVA

6406532051274. ✘ Chi square

Question Number : 135 Question Id : 640653614487 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Comparison of the unaided brand awareness proportion for a brand before and halfway through an ad campaign

Options :

6406532051275. ✘ T test for means, independent samples

6406532051276.

* T test for means, dependent samples

6406532051277. ✓ Z test for proportions

6406532051278. * ANOVA

6406532051279. * Chi square

Question Number : 136 Question Id : 640653614488 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Comparison of the satisfaction mean score between two branches of a mobile service and repair centre. The two branches cater to different sets of customers altogether

Options :

6406532051280. ✓ T test for means, independent samples

6406532051281. * T test for means, dependent samples

6406532051282. * Z test for proportions

6406532051283. * ANOVA

6406532051284. * Chi square

Question Number : 137 Question Id : 640653614489 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

A market research study is being done through a sample survey in the four largest metros in the country. Sampling is done from a list of people living in these towns. We need to test whether the achieved sample sizes in the four towns are in the same distribution as the population in the same four towns

Options :

6406532051285. ❌ T test for means, independent samples

6406532051286. ❌ T test for means, dependent samples

6406532051287. ❌ Z test for proportions

6406532051288. ❌ ANOVA

6406532051289. ✓ Chi square

Sub-Section Number : 4

Sub-Section Id : 64065388916

Question Shuffling Allowed : No

Is Section Default? : null

Question Id : 640653614490 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Question Numbers : (138 to 147)

Question Label : Comprehension

Which of the syndicated studies gives the output mentioned in the given subquestions.

Sub questions

Question Number : 138 Question Id : 640653614491 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Market share of brands from a panel of retailers?

Options :

6406532051290. ❌ Consumer panel

6406532051291. ❌ Indian Readership Study

6406532051292. ✘ TV Audience panel

6406532051293. ✓ Retail audit

6406532051294. ✘ Radio Audience Panel

6406532051295. ✘ Press ad expenditure track

6406532051296. ✘ TV ad expenditure track

6406532051297. ✘ Radio ad expenditure track

6406532051298. ✘ Prescription audit

Question Number : 139 Question Id : 640653614492 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

The gender profile of the consumers of a particular pack size of one brand?

Options :

6406532051299. ✓ Consumer panel

6406532051300. ✘ Indian Readership Study

6406532051301. ✘ TV Audience panel

6406532051302. ✘ Retail audit

6406532051303. ✘ Radio Audience Panel

6406532051304. ✘ Press ad expenditure track

6406532051305. ✘ TV ad expenditure track

6406532051306. ✘ Radio ad expenditure track

6406532051307. ✘ Prescription audit

Question Number : 140 Question Id : 640653614493 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

The share of departmental stores in the sales volume of soft drinks?

Options :

6406532051308. ✘ Consumer panel

6406532051309. ✘ Indian Readership Study

6406532051310. ✘ TV Audience panel

6406532051311. ✓ Retail audit

6406532051312. ✘ Radio Audience Panel

6406532051313. ✘ Press ad expenditure track

6406532051314. ✘ TV ad expenditure track

6406532051315. ✘ Radio ad expenditure track

6406532051316. ✘ Prescription audit

Question Number : 141 Question Id : 640653614494 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Which segment of consumers are increasing their consumption of a particular brand?

Options :

6406532051317. ✓ Consumer panel

6406532051318. ✘ Indian Readership Study

6406532051319.

* TV Audience panel

6406532051320. * Retail audit

6406532051321. * Radio Audience Panel

6406532051322. * Press ad expenditure track

6406532051323. * TV ad expenditure track

6406532051324. * Radio ad expenditure track

6406532051325. * Prescription audit

Question Number : 142 Question Id : 640653614495 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

The % of people who were exposed to atleast one insertion of the client's ad in a TV campaign?

Options :

6406532051326. * Consumer panel

6406532051327. * Indian Readership Study

6406532051328. ✓ TV Audience panel

6406532051329. * Retail audit

6406532051330. * Radio Audience Panel

6406532051331. * Press ad expenditure track

6406532051332. * TV ad expenditure track

6406532051333. * Radio ad expenditure track

6406532051334. * Prescription audit

Question Number : 143 Question Id : 640653614496 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

The number of people who read an issue of the daily newspaper TOI in the last 24 hours?

Options :

6406532051335. ✘ Consumer panel

6406532051336. ✓ Indian Readership Study

6406532051337. ✘ TV Audience panel

6406532051338. ✘ Retail audit

6406532051339. ✘ Radio Audience Panel

6406532051340. ✘ Press ad expenditure track

6406532051341. ✘ TV ad expenditure track

6406532051342. ✘ Radio ad expenditure track

6406532051343. ✘ Prescription audit

Question Number : 144 Question Id : 640653614497 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

The number of magazine ads placed by a brand's competitors?

Options :

6406532051344. ✘ Consumer panel

6406532051345. ✘ Indian Readership Study

6406532051346.

* TV Audience panel

6406532051347. * Retail audit

6406532051348. * Radio Audience Panel

6406532051349. ✓ Press ad expenditure track

6406532051350. * TV ad expenditure track

6406532051351. * Radio ad expenditure track

6406532051352. * Prescription audit

Question Number : 145 Question Id : 640653614498 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

The number of people who listened to a Suryan FM station from 10 am to 12 noon on Saturday?

Options :

6406532051353. * Consumer panel

6406532051354. * Indian Readership Study

6406532051355. * TV Audience panel

6406532051356. * Retail audit

6406532051357. ✓ Radio Audience Panel

6406532051358. * Press ad expenditure track

6406532051359. * TV ad expenditure track

6406532051360. * Radio ad expenditure track

6406532051361. * Prescription audit

Question Number : 146 Question Id : 640653614499 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

The total number of impressions garnered by an ad campaign on TV?

Options :

6406532051362. ✘ Consumer panel

6406532051363. ✘ Indian Readership Study

6406532051364. ✓ TV Audience panel

6406532051365. ✘ Retail audit

6406532051366. ✘ Radio Audience Panel

6406532051367. ✘ Press ad expenditure track

6406532051368. ✘ TV ad expenditure track

6406532051369. ✘ Radio ad expenditure track

6406532051370. ✘ Prescription audit

Question Number : 147 Question Id : 640653614500 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

The share of TV ad spend for each brand in a category?

Options :

6406532051371. ✘ Consumer panel

6406532051372. ✘ Indian Readership Study

6406532051373.

* TV Audience panel

6406532051374. * Retail audit

6406532051375. * Radio Audience Panel

6406532051376. * Press ad expenditure track

6406532051377. ✓ TV ad expenditure track

6406532051378. * Radio ad expenditure track

6406532051379. * Prescription audit

Intro to BigData

Section Id :	64065341430
Section Number :	7
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	22
Number of Questions to be attempted :	22
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 :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	64065388917
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 148 Question Id : 640653614501 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : INTRODUCTION TO BIG DATA (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 :

6406532051380. ✓ YES

6406532051381. ✘ NO

Sub-Section Number : 2

Sub-Section Id : 64065388918

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 149 Question Id : 640653614502 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

What are some capabilities common to both “streaming processing” & “batch processing” in the context of big data?

Options :

6406532051382.

✓ Batch operates on a set of data elements taken together while streaming can also operate on a set of data elements as determined by the window

6406532051383. ✘ Batch operates on data that is static while streaming operates on data that is dynamically changing

6406532051384. ✘ Batch processing can assume data as fully specified and complete while streaming cannot make that assumption

6406532051385. ✘ Batch processing is typically high latency while streaming processing is necessary for real-time latencies

6406532051386. ✓ Both Streaming & Batch processing can operate on massively large data sets

Question Number : 150 Question Id : 640653614503 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following are best practices associated with Streaming applications?

Options :

6406532051387. ✓ Use a message store that supports message replay so that no data is lost in processing.

6406532051388. ✘ “Hot potato” principle is when the streaming application operates on data from cache (i.e. the hot area of memory) and therefore is able to produce very high throughput

6406532051389. ✘ Hadoop is best suited for executing Streaming applications

6406532051390. ✓ Use checkpointing when faced with mission-critical workloads that require 100% accuracy.

6406532051391. ✘ Handle state pollution by restarting the persistent store software periodically.

Question Number : 151 Question Id : 640653614506 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

You are given the task of improving the performance of a Spark SQL program. You suspect that the culprit is the main transformation job in the program. When you run EXPLAIN on that SQL, you see that Spark wrongly estimates that there are only 10 values for the key being aggregated, whereas in reality the underlying data has a million values for that key. What actions would you perform from the below to ensure that the right estimates are used?

Options :

6406532051402. ❌ Create all tables as external tables.

6406532051403. ✓ Ensure cost based optimizer (CBO) is ON.

6406532051404. ❌ Partition all tables on the same key on which the aggregate is happening.

6406532051405. ✓ Run ANALYZE on all tables.

6406532051406. ❌ Cache the table in a step with actions ahead of the SQL statement that is the culprit.

Question Number : 152 Question Id : 640653614513 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements are true?

Options :

6406532051433. ✓ In pull delivery, your subscriber application initiates requests to the Pub/Sub server to retrieve messages.

6406532051434. ✓ In push delivery, Pub/Sub initiates requests to your subscriber application to deliver messages.

6406532051435.

✓ Pull subscription is preferred when efficiency and throughput of message processing is critical.

6406532051436. ✘ The rate of delivery needs to be controlled by the subscriber client in push subscription.

Sub-Section Number : 3

Sub-Section Id : 64065388919

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 153 Question Id : 640653614504 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

What happens when a Spark Structured Streaming pipeline operating with Kafka as source is subject to a failure of a machine in either of the Kafka cluster or the Spark cluster?

Options :

6406532051392. ✘ Failure of a machine in the Kafka cluster will result in an Exception in the Spark pipeline which will then fail and halt.

6406532051393. ✘ The Spark pipeline will not be able to start again from previously committed offset by restarting itself, resulting in at least-once processing semantics

6406532051394. ✘ Irrespective of whatever machine fails, Spark will throw an error and halt.

6406532051395. ✓ The pipeline will be restarted automatically by Spark which is able to pick up the exact data from Kafka which was being processed at the time of error, resulting in exactly-once semantics.

6406532051396. ✘ Data that is being processed will not be processed again, resulting in atmost-once semantics.

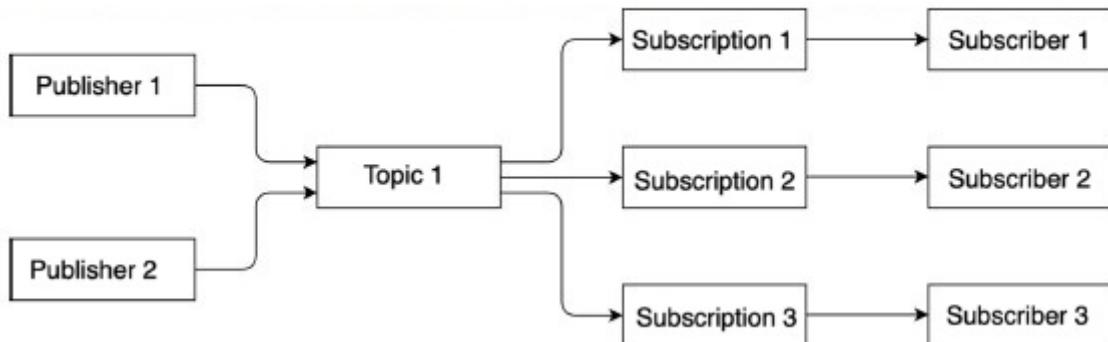
Question Number : 154 Question Id : 640653614514 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Observe the below image and select the options that are true.



Options :

6406532051437. ❌ Each subscriber gets one third of all messages published into *Topic 1*.

6406532051438. ❌ Publisher 1 can safely send data only for Subscriber 1's consumption while restricting access to Subscribers 2 & 3.

6406532051439. ❌ Subscriber 2 gets all messages published into *Topic 1* by *Publisher 1* but only half of Publisher 2's messages.

6406532051440. ✓ Each subscriber gets all messages published into *Topic 1*.

Question Number : 155 Question Id : 640653614520 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

A Spark Streaming application is configured to execute once per minute. However, each run takes 10+ minutes consistently resulting in a never-ending backlog of work. The code in a nutshell looks as follows:

```
clicks = (    # schema - adId: String, clickTime: Timestamp, ...
    spark
        .readStream
        .format("kafka")
        .option("subscribe", "clicks")
        ...
        .load()
)
clicks
    .join(pages, "pageId")
    .groupBy("pageName")
    .count()
```

Your goal is to optimize the code to bring down execution of each iteration within 1 minute. Which of the following represent options that will help in this mission?

Options :

Convert to batch and use cron to schedule for every 1 minute since streaming
6406532051462. ❌ computation has more overhead than batch processing

Ensure "pages" dataframe is broadcast before the streaming begins so that each
6406532051463. ✓ executor has access to its own copy without having to reshuffle

Rewrite the join code as follows

```
clicks
    .groupBy("pageId")
    .count()
    .join(pages, "pageId")
6406532051464. ❌     .select("pagename", "count")
```

Rewrite the join code as follows

```
pages
    .join(clicks, "pageId")
    .groupBy("pageName")
6406532051465. ❌     .count()
```

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

You are given a Spark program that runs on a Google Dataproc cluster on a daily schedule from 1AM-12PM to produce as output the total amount of purchases made by every customer the previous day. The data is coming into GCS every minute from a variety of sources as standalone files. Therefore, the business leader now feels that having to wait till 12PM the next day is no longer acceptable and instead wants approximate purchase information for each customer at least every 5 minutes. What's more, she wants to be able to change this time window later as she pleases without involving you.

Which amongst the below represents the best option to achieve the above?

Options :

6406532051466. ❌ Change the code to run every 5 minutes, no other change required

6406532051467. ❌ Change the code to leverage Spark Streaming with streaming window as "5 minutes", & let her manage the execution of the code on Dataproc

6406532051468. ❌ Write a Cloud Function to move all incoming per-minute standalone files from GCS to Pub/Sub, change the code to leverage Spark Streaming with streaming window as "5 mins", convert from Dataproc to Dataflow, point source to Pub/Sub, & let her manage the execution of the code on Dataflow

6406532051469. ✓ Change the code to leverage Spark Streaming with streaming window as "5 minutes", convert from Dataproc to Dataflow, & let her manage the execution of the code on Dataflow

Sub-Section Number : 4

Sub-Section Id : 64065388920

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 157 Question Id : 640653614505 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

A big data streaming application that uses Kafka as source is observed to be really slow. The Kafka cluster has 2 broker nodes and this application is reading from 1 topic that has 10 partitions. On closer investigation, it was found that Kafka is not scaling to the velocity of input data coming in. What can you first try to do to scale Kafka further while incurring minimal costs?

Options :

6406532051397. ❌ Add disks to each broker in the cluster, and disks are the cheapest computer component

6406532051398. ❌ Add new brokers to the cluster, even though this is more expensive than the other options this is the only foolproof way to scale.

6406532051399. ✓ Increase memory in each of the brokers in the cluster. While cost of memory is more than cost of disks, it is still cheaper than adding brokers and helps to scale.

6406532051400. ❌ Create more topics and change input application to reroute data to all topics to be able to spread input data better. This is nearly the least expensive since only developer effort is required to change application.

6406532051401. ❌ Double the number of partitions for this single topic to be able to spread input data better. This is the least expensive since only administrator effort is required without changing application.

Question Number : 158 Question Id : 640653614507 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

A company with headquarters (HQ) in the Middle East operates on a Sunday-Thursday weekday schedule with Friday & Saturday as weekend days. It computes end of week revenue numbers using an ETL pipeline by first computing sales for each day at 1AM local time of the next day, and

then summing up the weekly sales every Sunday early morning at 3AM local time. This number gets reported to leadership every Sunday morning 9AM local time, so the ETL pipeline is scheduled to run every Sunday morning at 8AM local time. As a result of management change, it has decided to relocate its HQ to India. Which of the following changes will need to be done to its ETL pipeline to ensure the correct output continues to be produced?

Options :

6406532051407. ❌ The business time for the final weekly sum operation needs to be changed to that of Monday 3AM India time instead of Sunday 3AM Middle East time.

6406532051408. ❌ Since time zone has changed as well as week definition too, the definition of business time has changed. So, the ETL has to be rewritten entirely.

6406532051409. ❌ Nothing needs to change since daily sales is available at 1AM Middle East time which is anyway behind India time and so the numbers will be available before leadership comes in at 9AM.

6406532051410. ❌ Event time has changed since the event of week ending has changed in definition, and so the ETL needs to be changed to consider the new event in the data.

6406532051411. ✓ No change required since neither event time nor business time is changing whereas only the operational time is changing.

Question Number : 159 Question Id : 640653614508 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

You are appointed as a Data Engineer in a company that has a legacy reporting application written in Java which suffers from performance problems. The reporting application plots dashboards with near real-time refresh (once every minute) of key business indicators to help management take live decisions. The application reads data directly from the source database of MongoDB, aggregates using simple counts and shows them visually in a UI. The performance problem of this application comes because the source database is at times overloaded and therefore the dashboard is not able to refresh fast enough. Choose from the options below the option that best

addresses performance with minimal maintenance effort:

Options :

6406532051412. ❌ Since MongoDB is OLTP, it is not able to support business reporting. So, replace it with Hadoop which supports OLAP better

6406532051413. ❌ Convert the application from using plain Java to using Spark Streaming in Java

6406532051414. ❌ Query MongoDB every 1 minute for new data using a check on document inserted timestamp, use Spark Streaming to compute the KPIs with the queried data, and then populate into a NoSQL DB like Redis for the UI to consume.

6406532051415. ✓ Extract raw data from MongoDB using Change Data Capture (CDC) once every minute into Kafka, and then use Spark Streaming to compute the KPIs and then populate into a NoSQL DB like Redis for the UI to consume.

6406532051416. ❌ Convert application to using Python along with a NoSQL database for storing and retrieving the aggregated counts.

Question Number : 160 Question Id : 640653614509 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Dhoni is on the crease with a bat in hand that has sensors embedded throughout. The sensors talk to the spider cam every second. The spider cam is itself a powerful ARM-based computer which has connectivity to the cloud through the wire on which it hangs. Using this connectivity, it can send as much or as little data as required and also receive instructions from the cloud. There is a machine learning model which suggests to the batsman to loosen the grip on his bat or tighten it based on the shots played using the sensor measurements. The way the suggestion happens is using dynamic vibration intensity communicated to the sensors embedded in the bat handle. Your task is to design the data pipeline that enables such feedback to Dhoni ideally before every ball with as much accuracy as possible throughout the match. Which of the following options best satisfies the requirements?

Options :

6406532051417. ❖ Ingest all data into Pub/Sub, process using Google Cloud Dataflow, invoke the ML model, and then write back output from Cloud to the spider cam to relay to the bat.

6406532051418. ❖ Compress the ML model to fit into the spider cam's available resource, and write pipelines to execute the model in the spider cam itself

6406532051419. ❖ Compress the data in the spider cam every 5 seconds, write to Pub/Sub the compressed data, invoke the ML model and then write back output from Cloud to the spider cam to relay to the bat.

6406532051420. ✓ Compress the ML model to fit into the spider cam's available resource, and write pipelines to execute in the spider cam itself, with periodically data being sent to the cloud, retrain the model using Google Cloud ML and then redeploy the model to the spider cam.

Question Number : 161 Question Id : 640653614510 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

In the class, we saw the UDF for mobilenet_v2. By definition, UDFs are scalar. In Spark, there is another class of user defined routines called UDAFs, which stand for User Defined Aggregator Functions. UDAFs are meant to provide a means to write a custom aggregation function which aggregates over a grouping of values to arrive at a single value. UDAF structure differs saliently from UDFs in that it exposes the notion of a buffer as a way of maintaining intermediate state before finalizing aggregate output. Why is a buffer required for UDAF and not for a UDF?

Options :

6406532051421. ❖ A UDF is a scalar operation executing on 1 row at a time and producing output immediately, and therefore there is no intermediate output necessary. Whereas, a UDAF operates on multiple rows which will require multiple passes for the final output thereby requiring a buffer.

6406532051422. ❖ A UDF is a scalar operation executing on many rows at a time, grouped by a key and producing a single output, and therefore there is no intermediate output necessary. Whereas, a UDAF operates on multiple rows which will require multiple passes for the final output thereby requiring a buffer.

6406532051423. ✓ A UDF is a scalar operation executing on 1 row at a time and producing output immediately, and therefore there is no intermediate output necessary. Whereas, a UDAF operates on multiple rows of unbounded size requiring a divide-and-conquer approach for computing aggregates, which uses the intermediate buffer to store partial values before finalizing the result aggregate.

6406532051424. ✗ A UDF is a scalar operation executing on many rows at a time, grouped by a key and producing a single output, and therefore there is no intermediate output necessary. Whereas, a UDAF operates on multiple rows of unbounded size requiring a divide-and-conquer approach for computing aggregates, which uses the intermediate buffer to store partial values before finalizing the result aggregate.

Question Number : 162 Question Id : 640653614511 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

In the class, we saw the UDF for mobilenet_v2. Specifically, the predict() function contained the below lines of code

```
def predict(content_series_iter):
    model = model_fn()
    model.eval()
    ...
```

Suppose there's a simpler XGboost model that is able to provide the same or better F1 score than the mobilenet_v2. Will these lines of code still be required in the pipeline?

Options :

6406532051425. ✗ Yes, since they check the syntax of the model function so that there are no errors

6406532051426. ✗ They invoke PyTorch libraries that have already been setup for model scoring on GCP using APIs embedded within the function

6406532051427. ✓ No, since the primary function of these lines of code is to eliminate repeated DL model loads as DL models are large in size but with XGboost this isn't required since model load time is negligible

6406532051428.

- * They are Map-style UDFs that make it an embarrassingly parallel computation thus making the execution parallelized and fast.

Question Number : 163 Question Id : 640653614512 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

You are given a Spark Streaming pipeline that invokes a pre-trained DL model for every image it receives as input and produces the classification result in quick time. The model with the best recall rate from the PyTorch library already runs in under 3 seconds on an average executing on a single GPU Spark worker machine. However, your management has instructed you to reduce the cost of AI projects significantly. What is the best option to explore to meet the expectations without compromising on false negatives while also being within 10-20% of the average execution time?

Options :

6406532051429. * Use a different DL model from PyTorch that is already compressed to half the size.

6406532051430. * Build a custom model that compresses the highest recall rate model just enough to be able to execute within the stipulated time, and measure recall.

6406532051431. * Remove complexity associated with Spark Streaming and convert the model execution pipeline into a single threaded Python application running on the same GPU machine.

6406532051432. ✓ Change Spark machine to use CPUs and train a fresh pipeline to achieve objectives.

Question Number : 164 Question Id : 640653614515 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Which of the following code snippets will give a runtime error? (Note: df is a spark dataframe. It has a column called content which has images represented as byte array)

Options :

```
distributed > new.py > ...
1  from pyspark.sql.types import StructType
2  from typing import Iterator
3
4  def imagenet_model_udf():
5      def predict(content_series_iter : Iterator[pd.Series]) -> Iterator[pd.Series]:
6          model = models.mobilenet_v2(pretrained=True)
7          model.eval()
8          for content_series in content_series_iter:
9              dataset = ImageNetDataset(list(content_series))
10             loader = DataLoader(dataset, batch_size=64)
11             with torch.no_grad():
12                 for image_batch in loader:
13                     predictions = model(image_batch).numpy()
14                     predicted_labels = [x[0] for x in decode_predictions(predictions, top=1)]
15                     yield pd.DataFrame(predicted_labels)
16     return pandas_udf(predict,"class: string, desc: string, score:float")
17
18 imagenet = imagenet_model_udf()
19 predictions = df.withColumn("prediction", imagenet(col("content")))
20 predictions.select(col("label"),col("prediction")).show(50,truncate=False)
21 |
```

6406532051441. ❌

```
distributed > new.py > ...
1  from pyspark.sql.types import StructType
2  from typing import Iterator
3  @pandas_udf("class: string, desc: string, score:float")
4  def imagenet_model_udf():
5      def predict(content_series_iter : Iterator[pd.Series]) -> Iterator[pd.Series]:
6          model = models.mobilenet_v2(pretrained=True)
7          model.eval()
8          for content_series in content_series_iter:
9              dataset = ImageNetDataset(list(content_series))
10             loader = DataLoader(dataset, batch_size=64)
11             with torch.no_grad():
12                 for image_batch in loader:
13                     predictions = model(image_batch).numpy()
14                     predicted_labels = [x[0] for x in decode_predictions(predictions, top=1)]
15                     yield pd.DataFrame(predicted_labels)
16     return (predict)
17
18 imagenet = imagenet_model_udf()
19 predictions = df.withColumn("prediction", imagenet(col("content")))
20 predictions.select(col("label"),col("prediction")).show(50,truncate=False)
21
22
23
24
25 |
```

6406532051442. ✓

6406532051443. ❌

```

distributed > new.py > ...
1  from pyspark.sql.types import StructType
2  from typing import Iterator
3  def imagenet_model_udf():
4      @pandas_udf("class: string, desc: string, score:float")
5      def predict(content_series_iter : Iterator[pd.Series]) -> Iterator[pd.Series]:
6          model = models.mobilenet_v2(pretrained=True)
7          model.eval()
8          for content_series in content_series_iter:
9              dataset = ImageNetDataset(list(content_series))
10             loader = DataLoader(dataset, batch_size=64)
11             with torch.no_grad():
12                 for image_batch in loader:
13                     predictions = model(image_batch).numpy()
14                     predicted_labels = [x[0] for x in decode_predictions(predictions, top=1)]
15                     yield pd.DataFrame(predicted_labels)
16     return predict
17
18 imagenet = imagenet_model_udf()
19 predictions = df.withColumn("prediction", imagenet(col("content")))
20 predictions.select(col("label"), col("prediction")).show(50, truncate=False)
21 |

```

```

from pyspark.sql.types import StructType
from typing import Iterator

def imagenet_model_udf(model_fn):

    def predict(content_series_iter : Iterator[pd.Series]) -> Iterator[pd.Series]:
        model = model_fn()
        model.eval()
        for content_series in content_series_iter:
            dataset = ImageNetDataset(list(content_series))
            loader = DataLoader(dataset, batch_size=64)
            with torch.no_grad():
                for image_batch in loader:
                    predictions = model(image_batch).numpy()
                    predicted_labels = [x[0] for x in decode_predictions(predictions, top=1)]
                    yield pd.DataFrame(predicted_labels)

    return pandas_udf("class: string, desc: string, score:float")(predict)

imagenet = imagenet_model_udf(lambda: models.mobilenet_v2(pretrained=True))
predictions = df.withColumn("prediction", imagenet(col("content")))
predictions.select(col("label"), col("prediction")).show(50, truncate=False)

```

6406532051444. ❌

Question Number : 165 Question Id : 640653614516 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Consider a Structured Streaming application running on Google Dataproc firing up every 10 seconds, consuming any number of records from Kafka available since last read, and emitting some computed answers to another Kafka topic. Consider also that apart from the functional logic, the same application is also emitting into a file the start time and end time of every batch invocation for audit purposes.

Assume there is a failure in one of the Dataproc machines that results in a failure of a specific run. For the external world (i.e. anybody consuming the outputs of this application), will they see any change in output as a result of the failure at all, or will the only impact of failure be one of slower performance for the failed-and-retried run? select the one from the list below that answer this question.

Options :

6406532051445. ❌ No, the failure is not visible. The only visible effect for the external world would be in the form of a slowdown in runtime for completion of that batch as Structured Streaming retries the batch that failed thus taking twice as much time as normal.

6406532051446. ❌ No, no failure is visible since Structured Streaming uses transactions and idempotence to achieve exactly-once processing.

6406532051447. ✓ Yes, the failure is visible because the side effect of emitting timestamps in a batch will be visible as 2 consecutive Start timestamps without any end timestamp as Structured Streaming retries the failed batch.

6406532051448. ❌ No, no failure is visible since Structured Streaming can process the same data in a retry resulting in the same outputs again.

Question Number : 166 Question Id : 640653614517 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Let us say we are using structured streaming for continuously reading data from Kafka and

storing the results back into a Kafka topic using window function aggregates. Now, instead, we decide that we need to just perform a one-time batch operation using the same logic, where there is a need to read specific data from Kafka (i.e. using pre-determined offsets). How will we need to modify the code to make it work?

Options :

6406532051449. ❌ The read and write commands will remain the same, but the remaining code will need to be modified, as operations on streaming dataframes are not supported on static dataframes.

6406532051450. ✓ Only the read and write commands need to be modified to specify that it's a batch operation.

6406532051451. ❌ The entire code will need to be modified as the APIs for stream and batch processing are completely different.

6406532051452. ❌ The read and write commands need to be modified to specify that it's a batch operation. Further, the specific logic of window functions will also need to be modified since there are no time windows anymore in batch processing.

Question Number : 167 Question Id : 640653614518 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Consider a Kafka system that has two brokers with the exact same resources. Let's consider a topic A with a single partition, whose two copies are being maintained in sync by Kafka. Consider the following cases:

Case 1: Both the copies reside in the same broker

Case 2: Each broker has one copy of the partition

Two of the key promises of Kafka are:

(i) Availability

(ii) Throughput

Regarding which of the above promises, case 2 is at an advantage as compared to case 1?

Options :

6406532051453. ✓ Only (i)

6406532051454. ✗ Only (ii)

6406532051455. ✗ Both (i) and (ii)

6406532051456. ✗ Neither (i) nor (ii)

Question Number : 168 Question Id : 640653614519 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Kubernetes is an open-source system for automating deployment, scaling and management of containerized applications. Google Datastore and HBase are both highly-scalable NoSQL database systems for interactive, real-time applications. Consider the following pipeline choices for effecting the same outcome:

- (i) Shell producer on VM on GCP → Pub/Sub → Spark Streaming on Hadoop VMs on GCP → HBase on same Hadoop VMs on GCP
- (ii) Shell producer in Google Cloud Function → Kafka VM on GCP → Dataflow → Datastore
- (iii) Shell producer in Kubernetes on GCP → Pub/Sub → Spark Streaming on Google Dataproc → Datastore
- (iv) Shell producer on VM on GCP → Pub/Sub → Dataflow → Datastore
- (v) Shell producer in Kubernetes on GCP → Pub/Sub → Spark Streaming on Hadoop VMs on GCP → HBase on same Hadoop VMs on GCP

Which option below represents the correct order of pipeline options that has the “most IaaS” entry to the left and the “most PaaS” entry to the right?

Options :

6406532051457. ✓ (i), (v), (iii), (iv), (ii)

6406532051458. ✗ (i), (ii), (iii), (iv), (v)

6406532051459. ✗ (ii), (iii), (i), (iv), (v)

6406532051460. ✗ (v), (iii), (i), (iv), (ii)

6406532051461. ✗ All are equally PaaS / IaaS

Question Number : 169 Question Id : 640653614522 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Since it is the onset of summer, there is a surge in railway ticket bookings. The business head at IRCTC is interested in a real-time view of all of her stations irrespective of whether there were bookings or not. She wants to see this be presented in a monitor mounted in her office wall that refreshes with the latest info on an India map every 1 minute along with the time of update so that she gets the confirmation that this is the latest data, so that she can plan for new summer-special trains as required. What solution option below best solves for the need?

Options :

6406532051470. ✗ Route a copy of the ticket purchase to a Kafka topic, use Spark Structured Streaming to continuously read from this topic and update the aggregates by destinations, and emit using output mode "Update".

6406532051471. ✓ Route a copy of the ticket purchase to a Kafka topic, use Spark Structured Streaming to periodically read from this topic every 1 minute and update the aggregates by destinations, and emit all aggregates using the output mode "Complete".

6406532051472. ✗ Route a copy of the ticket purchase to a Kafka topic, use Spark Structured Streaming to periodically read from this topic every 1 minute and count the destinations in that batch, and emit only all aggregates in that batch using the output mode "Append".

Fin Forensics

Section Id :	64065341431
Section Number :	8
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	41
Number of Questions to be attempted :	41
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 :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	64065388921
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 170 Question Id : 640653614523 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : FINANCIAL FORENSICS (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 :

6406532051473. ✓ YES

6406532051474. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 64065388922

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 171 Question Id : 640653614524 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Nu-Tools plans to set aside an equal amount of money each year, starting today, so that it will have ₹ 25,000 saved at the end of three years. If the firm can earn 4.7 percent, how much does it have to save annually?

Options :

6406532051475. ✓ ₹ 7,596.61

6406532051476. ✗ ₹ 7,689.16

6406532051477. ✗ ₹ 8,004.67

6406532051478. ✗ ₹ 8,333.33

Question Number : 172 Question Id : 640653614525 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

One year ago, the Jenkins Family Fun Center deposited ₹ 4,300 into an investment account for the purpose of buying new equipment four years from today. Today, they are adding another ₹ 6,100 to this account. They plan on making a final deposit of ₹ 8,300 to the account next year. How much will be available when they are ready to buy the equipment, assuming they earn a rate of return of 6 percent?

Options :

6406532051479. ✓ ₹ 23,340.91

6406532051480. ✗ ₹ 22,712.91

6406532051481. ✗ ₹ 22,229.00

6406532051482. ✗ ₹ 22,005.01

Question Number : 173 Question Id : 640653614526 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Rosddale Flowers has a new greenhouse project with an initial cost of ₹ 297,500 that is expected to generate cash flows of ₹ 44,500 for 8 years and a cash flow of ₹ 59,900 in Year 9. If the required return is 7.6 percent, what is the project's NPV?

Options :

6406532051483. ✗ ₹ 16,152.95

6406532051484. ✗ -₹ 14,829.54

6406532051485. ✓ -₹ 6,864.09

6406532051486. ✗ ₹ 107,759.83

Question Number : 174 Question Id : 640653614527 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

You desire a portfolio beta of 1.1. Currently, your portfolio consists of ₹ 100 invested in Stock A with a beta of 1.4 and ₹ 300 in Stock B with a beta of 0.6. You have another ₹ 400 to invest and want to divide it between Stock C with a beta of 1.6 and a risk-free asset. How much should you invest in the risk-free asset to obtain your desired beta?

Options :

6406532051487. ✓ ₹ 50

6406532051488. ✗ ₹ 100

6406532051489. ✗ ₹ 125

6406532051490. ✗ ₹ 300

Question Number : 175 Question Id : 640653614528 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

A firm has debt of ₹ 7,000, equity of ₹ 12,000, a cost of debt of 7 percent, a cost of equity of 14 percent, and a tax rate of 21 percent. What is the firm's weighted average cost of capital?

Options :

6406532051491. ✗ 8.45 percent

6406532051492. ✗ 9.90 percent

6406532051493. ✓ 10.88 percent

6406532051494. ✗ 12.50 percent

Question Number : 176 Question Id : 640653614529 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Which of the following ratios is used to analyze profitability?

Options :

6406532051495. ✘ Earnings per share

6406532051496. ✘ Gross margin

6406532051497. ✘ Current ratio

6406532051498. ✓ Both Earnings per share and Gross margin

Question Number : 177 Question Id : 640653614530 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

At the end of the financial period, how would an excess payment of taxes beyond its obligation be presented in the financial statements ?

Options :

6406532051499. ✘ as an accrual revenue

6406532051500. ✓ as a prepaid expenses within current assets

6406532051501. ✘ as a liability due within one year

6406532051502. ✘ as an expense in the income statement

Question Number : 178 Question Id : 640653614531 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Which of the following would not appear in the investing section of the statement of cash flows?

Options :

6406532051503. ✘ Purchase of land for a new office building

6406532051504. ✘ Interest and dividend received

6406532051505. ✓ Purchase of inventory

6406532051506. ✘ Sale of obsolete equipment used in the factory

Question Number : 179 Question Id : 640653614532 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

While recording transactions the accountants of a firm mistakenly treats a capital expenditure items as revenue expenditure. What is the effect of this error ?

Options :

6406532051507. ✘ Gross profit is understated

6406532051508. ✘ Total assets are overstated

6406532051509. ✘ Net profit is overstated

6406532051510. ✓ Total assets are understated

Question Number : 180 Question Id : 640653614533 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Issued common stock for ₹ 18,000, sold office equipment for ₹ 1,200, paid cash dividends of ₹ 4,000, purchased investments for ₹ 2,000, purchased new equipment for ₹ 4,000. What was the net cash inflow (outflow) from investing activities?

Options :

6406532051511. ✓ (₹ 4,800)

6406532051512. ✗ (₹ 20,200)

6406532051513. ✗ (₹ 2,800)

6406532051514. ✗ (₹ 10,800)

Question Number : 181 Question Id : 640653614534 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Which of the following is the process of converting words into their base or root form?

Options :

6406532051515. ✗ Tokenization

6406532051516. ✗ Stop word removal

6406532051517. ✗ Stemming

6406532051518. ✓ Lemmatization

Question Number : 182 Question Id : 640653614535 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Input – Artificial intelligence technologies are being increasingly integrated into various industries to automate and optimize processes.

Output – Artificial intelligence technology be be increase integrate into various industry to automate and optimize process.

Which of the following pre-processing to input results in this output?

Options :

6406532051519. ✘ Stopword removal

6406532051520. ✘ Tokenisation

6406532051521. ✘ Stemming

6406532051522. ✓ Lemmatization

6406532051523. ✘ None of these

Question Number : 183 Question Id : 640653614536 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

As given in the confusion matrix of the classifier in Table 1, a bank provides loan to 300 prospects from a database. Selection of an actual good customer leads to an average profit of ₹10,000. Due to misclassification, if a bad applicant is selected for loan, an average loss of ₹30,000 will be incurred. Based on the data given in the confusion matrix (Table 1), what is the overall profit?

Table 1

Classification confusion matrix		
	Predicted Class	
Actual Class	1	0
1	187	19
0	63	31

Options :

6406532051524. ✘ 22,44,000

6406532051525. ✘ 12,40,000

6406532051526. ✓ -2,60,000

6406532051527.

* -7,60,000

6406532051528. * 25,20,000

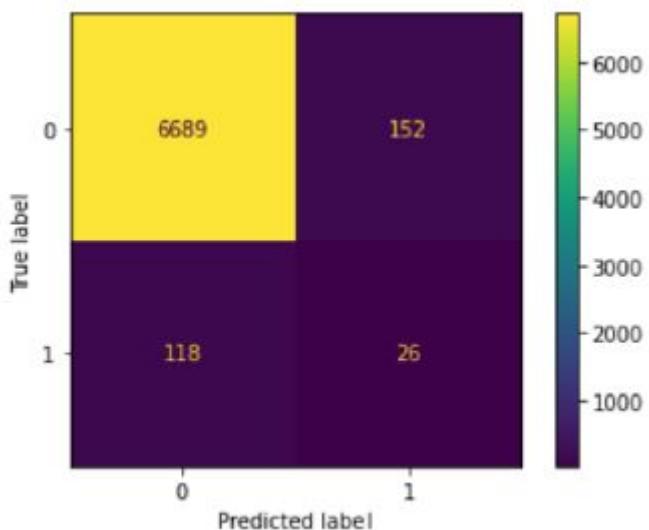
Question Number : 184 Question Id : 640653614537 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

What is the number of False Negatives?

PS: 1 is positive class, 0 is negative class



Options :

6406532051529. ✓ 118

6406532051530. * 152

6406532051531. * 26

6406532051532. * 6689

6406532051533. * 70

Question Number : 185 Question Id : 640653614538 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

What is the rollback rate for A?

After 12 MOB	After 18 MOB								Roll Back	Roll Forward	
	Delinquency	No Due	0-29 DPD	30- 59 DPD	60- 89 DPD	90- 119 DPD	120- 149 DPD	150+ DPD			
	No Due	44000	3340	2000	1340	680	440	200	52000		
After 12 MOB	0-29 DPD	18200	2680	1340	680	680	340	200	24120	75.46%	13.43%
	30-59 DPD	7680	2000	1340	280	200	80	480	12060	80.27%	8.62%
	60-89 DPD	2280	2000	680	140	680	540	340	6660	74.47%	B
	90-119 DPD	1340	340	200	80	280	1340	680	4260	A	47.42%
	120-149 DPD	200	80	80	60	60	340	800	1620	29.63%	49.38%
	150+ DPD	40	28	22	18	6	4	1400	1518	7.77%	0

Options :

6406532051534. ✘ 80.27%

6406532051535. ✓ 46.01%

6406532051536. ✘ 7.77%

6406532051537. ✘ 75.46%

6406532051538. ✘ 8.62%

Question Number : 186 Question Id : 640653614539 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

What is the roll forward rate for B?

	After 18 MOB										
	Delinquency	No Due	0-29 DPD	30-59 DPD	60-89 DPD	90-119 DPD	120-149 DPD	150+ DPD	Total	Roll Back	Roll Forward
After 12 MOB	No Due	44000	3340	2000	1340	680	440	200	52000		
	0-29 DPD	18200	2680	1340	680	680	340	200	24120	75.46%	13.43%
	30-59 DPD	7680	2000	1340	280	200	80	480	12060	80.27%	8.62%
	60-89 DPD	2280	2000	680	140	680	540	340	6660	74.47%	B
	90-119 DPD	1340	340	200	80	280	1340	680	4260	A	47.42%
	120-149 DPD	200	80	80	60	60	340	800	1620	29.63%	49.38%
	150+ DPD	40	28	22	18	6	4	1400	1518	7.77%	0

Options :

6406532051539. ✓ 23.42%

6406532051540. ✗ 8.62%

6406532051541. ✗ 49.38%

6406532051542. ✗ 13.43%

6406532051543. ✗ 46.01%

Question Number : 187 Question Id : 640653614540 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

How many applicants were in 0-29 DPD after 12 MOB?

After 12 MOB	After 18 MOB										
	Delinquency	No Due	0-29 DPD	30- 59 DPD	60- 89 DPD	90- 119 DPD	120- 149 DPD	150+ DPD	Total	Roll Back	Roll Forward
	No Due	44000	3340	2000	1340	680	440	200	52000		
	0-29 DPD	18200	2680	1340	680	680	340	200	24120	75.46%	13.43%
	30-59 DPD	7680	2000	1340	280	200	80	480	12060	80.27%	8.62%
	60-89 DPD	2280	2000	680	140	680	540	340	6660	74.47%	B
	90-119 DPD	1340	340	200	80	280	1340	680	4260	A	47.42%
	120-149 DPD	200	80	80	60	60	340	800	1620	29.63%	49.38%
	150+ DPD	40	28	22	18	6	4	1400	1518	7.77%	0

Options :

6406532051544. ✓ 24120

6406532051545. ✗ 18200

6406532051546. ✗ 2680

6406532051547. ✗ 52000

6406532051548. ✗ 1340

Question Number : 188 Question Id : 640653614541 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

What is the capture rate at top 30% (top 3 deciles)?

Decile	min_prob	max_prob	events	nonevents	event_rate	nonevent_rate	cum_eventrate	cum_noneventrate	KS
1	0.34	0.80	17651	429013	39.95%	9.70%	39.95%	9.70%	30.3
2	0.28	0.34	6154	440509	13.93%	9.96%	53.88%	19.66%	34.2
3	0.25	0.28	4602	442061	10.42%	10.00%	64.30%	29.66%	34.6
4	0.22	0.25	3315	443349	7.50%	10.02%	71.80%	39.68%	32.1
5	0.20	0.22	2864	443799	6.48%	10.04%	78.29%	49.72%	28.6
6	0.19	0.20	2434	444229	5.51%	10.04%	83.80%	59.76%	24
7	0.17	0.19	2089	444575	4.73%	10.05%	88.53%	69.81%	18.7
8	0.16	0.17	1914	444749	4.33%	10.06%	92.86%	79.87%	13
9	0.15	0.16	1654	445009	3.74%	10.06%	96.60%	89.93%	6.7
10	0.10	0.15	1501	445163	3.40%	10.07%	100.00%	100.00%	0

Options :

6406532051549. ✘ 39.95%

6406532051550. ✘ 53.88%

6406532051551. ✓ 64.30%

6406532051552. ✘ 71.80%

6406532051553. ✘ 78.29%

Question Number : 189 Question Id : 640653614542 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

What is the KS of the below gains table?

Decile	min_prob	max_prob	events	nonevents	event_rate	nonevent_rate	cum_eventrate	cum_noneventrate	KS
1	0.34	0.80	17651	429013	39.95%	9.70%	39.95%	9.70%	30.3
2	0.28	0.34	6154	440509	13.93%	9.96%	53.88%	19.66%	34.2
3	0.25	0.28	4602	442061	10.42%	10.00%	64.30%	29.66%	34.6
4	0.22	0.25	3315	443349	7.50%	10.02%	71.80%	39.68%	32.1
5	0.20	0.22	2864	443799	6.48%	10.04%	78.29%	49.72%	28.6
6	0.19	0.20	2434	444229	5.51%	10.04%	83.80%	59.76%	24
7	0.17	0.19	2089	444575	4.73%	10.05%	88.53%	69.81%	18.7
8	0.16	0.17	1914	444749	4.33%	10.06%	92.86%	79.87%	13
9	0.15	0.16	1654	445009	3.74%	10.06%	96.60%	89.93%	6.7
10	0.10	0.15	1501	445163	3.40%	10.07%	100.00%	100.00%	0

Options :

6406532051554. ✘ 30.3%

6406532051555. ✘ 34.2%

6406532051556. ✓ 34.6%

6406532051557. ✘ 6.7%

6406532051558. ✘ 22.22%

Question Number : 190 Question Id : 640653614543 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Y is a metric that is used to decide if a model has to be trained again. It captures the change in environment in which model was trained relative to the environment in which the model is deployed. What is Y?

Options :

6406532051559. ✓ Population Stability Index

6406532051560.

❖ Lift

6406532051561. ❖ Accuracy

6406532051562. ❖ R squared

6406532051563. ❖ VIF

Question Number : 191 Question Id : 640653614544 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Let's say you are bestowed with the responsibility of building an ML model for a popular fintech company for credit line assignment for its credit applicants. Credit line assignment is the process in the financial industry where lenders, banks, or credit card companies decide how much credit to extend to an individual or a business. It involves setting a specific maximum amount of money that a borrower is allowed to borrow or spend on a credit card or credit facility. Which of the following performance metric do you think will be best suitable for measuring your model's performance:

Options :

6406532051564. ❖ Accuracy

6406532051565. ❖ Mean Absolute Error

6406532051566. ❖ F1 Score

6406532051567. ❖ Root Mean Squared Error

6406532051568. ❖ Both Accuracy and F1 Score

6406532051569. ✓ Both Mean Absolute Error and Root Mean Squared Error

Question Number : 192 Question Id : 640653614545 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

A Fraud detection model a FinTech company is put to production which is used for flagging suspicious transactions from going through the company's payment system. On a given day the 500 transaction attempts were made in the company's payment system and the ML model has declined all the transaction attempts on the grounds of Fraud, upon taking a manual review it was noticed that all the 500 transaction attempts were indeed genuine. Now which of the following statement is True about the model.

Options :

6406532051570. ✘ Precision = 100%

6406532051571. ✘ Recall = 100%

6406532051572. ✓ Recall is Undefined

6406532051573. ✘ Recall = 0%

6406532051574. ✘ Precision is Undefined

Question Number : 193 Question Id : 640653614546 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Which of the following statement is incorrect?

Options :

6406532051575. ✘ Anomaly detection framework can be used for identifying types of frauds that are not known a priori.

6406532051576. ✘ Supervised learning framework can be used only when the type of frauds is known a priori.

6406532051577. ✓ Anomaly detection framework is always superior to supervised learning

framework.

6406532051578. ✖ One can use accuracy as a performance metric to measure the performance of Random Forest classification algorithm.

Question Number : 194 Question Id : 640653614547 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Fill the missing information to complete the confusion matrix below:

		Actual Class	
		Fraud	Non - Fraud
Predicted Class	Fraud	500	A
	Non - Fraud	B	10000

Total True Frauds = 520, Total data points that are classified by the model = 10620

Options :

6406532051579. ✖ A = 60, B = 60

6406532051580. ✖ A = 20, B = 100

6406532051581. ✓ A = 100, B = 20

6406532051582. ✖ Information insufficient

Question Number : 195 Question Id : 640653614548 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Presence of outliers will have a bad impact on Isolation Forest Algorithm, so they must be removed first before fitting the isolation forest model

Options :

6406532051583. ✘ TRUE

6406532051584. ✓ FALSE

Question Number : 196 Question Id : 640653614549 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

A fintech company has a ML system that identifies transaction frauds that occur in its system. The model currently has an accuracy of 99.9%. The fraud rate, as reported by the company in its system is 20 BPS. On a regular day there are close to above 1 million transactions that happens via the company's payment system, and for each fraudulent transaction the company losses INR 10 on an average. The annual savings (INR) brought in by the ML system is:

Options :

6406532051585. ✘ ~3.4M

6406532051586. ✘ ~7.2M

6406532051587. ✘ ~19.9K

6406532051588. ✓ Insufficient information to solve the problem

Question Number : 197 Question Id : 640653614550 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

What is the purpose of the Dickey-Fuller test in time series analysis?

Options :

6406532051589. ❌ To check for the presence of seasonality in the data.

6406532051590. ✓ To test for the presence of unit roots and assess stationarity.

6406532051591. ❌ To calculate the autocorrelation function (ACF) of the data.

6406532051592. ❌ To determine the appropriate lag order for an ARMA model.

Question Number : 198 Question Id : 640653614551 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

You have built a linear regression model for predicting the number of users who access your payment platform daily. The following table shows the model's performance:

Day	Model's prediction	True Value
Jan 1	20	22
Jan 2	15	20
Jan 3	16	23
Jan 4	8	16
Jan 5	50	30
Jan 6	70	95
Jan 7	50	80

Consider the following statements and choose the right option below:

Statement 1: Linear Regression is a not very good fit for this use case.

Statement 2: Linear Regression is a very good fit for this use case.

Statement 3: The model's errors are not normally distributed.

Options :

6406532051593. ✘ Statement 2 and 3 are correct.

6406532051594. ✘ Statement 1 is correct and statement 3 is not the right explanation for statement 1.

6406532051595. ✓ Statement 1 is correct and statement 3 is the right explanation for statement 1.

6406532051596. ✘ Statement 2 is correct and statement 3 is not the right explanation for statement 1.

Question Number : 199 Question Id : 640653614552 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

There are two time series models A and B which have the following predictions, which of these is more accurate from the perspective for MSE?

True value = [10, 12, 11, 15, 18, 20, 23]

Predictions of A = [7, 11, 15, 15, 16, 19, 30]

Predictions of B = [10, 11, 20, 16, 18, 25, 23]

Options :

6406532051597. ✓ A

6406532051598. ✘ B

Question Number : 200 Question Id : 640653614553 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

What does the autocorrelation function (ACF) measure in time series analysis?

Options :

6406532051599. ✘ The relationship between dependent and independent variables.

6406532051600. ✘ The degree of randomness in the data.

6406532051601. ✓ The correlation between the current value and a lagged value of the series.

6406532051602. ✘ The difference between the current value and the mean of the series.

Question Number : 201 Question Id : 640653614554 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

You have the following 2 documents with the text:

D1 = Get Out Get Going

D2 = Get along with the crowd

The Term Frequency (TF) for the word "Get" for D1 and D2 is :

Options :

6406532051603. ✓ 3

6406532051604. ✘ 1

6406532051605. ✘ 0

6406532051606. ✘ 2

Question Number : 202 Question Id : 640653614555 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

The following metrics cannot be used to calculate string similarity:

Options :

6406532051607. ❌ Cosine similarity

6406532051608. ❌ Levenshtein distance

6406532051609. ❌ Both Cosine similarity and Levenshtein distance

6406532051610. ✓ Sine similarity

Question Number : 203 Question Id : 640653614556 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

If cosine similarity between two string vectors is high, it means

Options :

6406532051611. ✓ The strings are similar.

6406532051612. ❌ The strings are dissimilar.

6406532051613. ❌ Grammatically they are dissimilar.

6406532051614. ❌ None of these

Question Number : 204 Question Id : 640653614557 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

You had converted two words to a vectors having following values:

$$A = [1, 4, 6, 8, 2]$$

$$B = [1, 3, 6, 9, 0]$$

The cosine similarity between them is:

Options :

6406532051615. ✓ 0.976

6406532051616. ✗ 0.782

6406532051617. ✗ 0.890

6406532051618. ✗ 0.823

Question Number : 205 Question Id : 640653614558 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

You had converted two words to a vectors having following values:

$$A = [1,2,3,4,5]$$

$$B = [5,4,3,2,1]$$

The cosine similarity between them is:

Options :

6406532051619. ✓ 0.636

6406532051620. ✗ 0.962

6406532051621. ✗ 0.915

6406532051622. ✗ 0.893

Question Number : 206 Question Id : 640653614559 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Global explainability lets the model owner determine to what extent each feature contributes to how the model makes its predictions over all of the data.

Options :

6406532051623. ✓ TRUE

6406532051624. ✗ FALSE

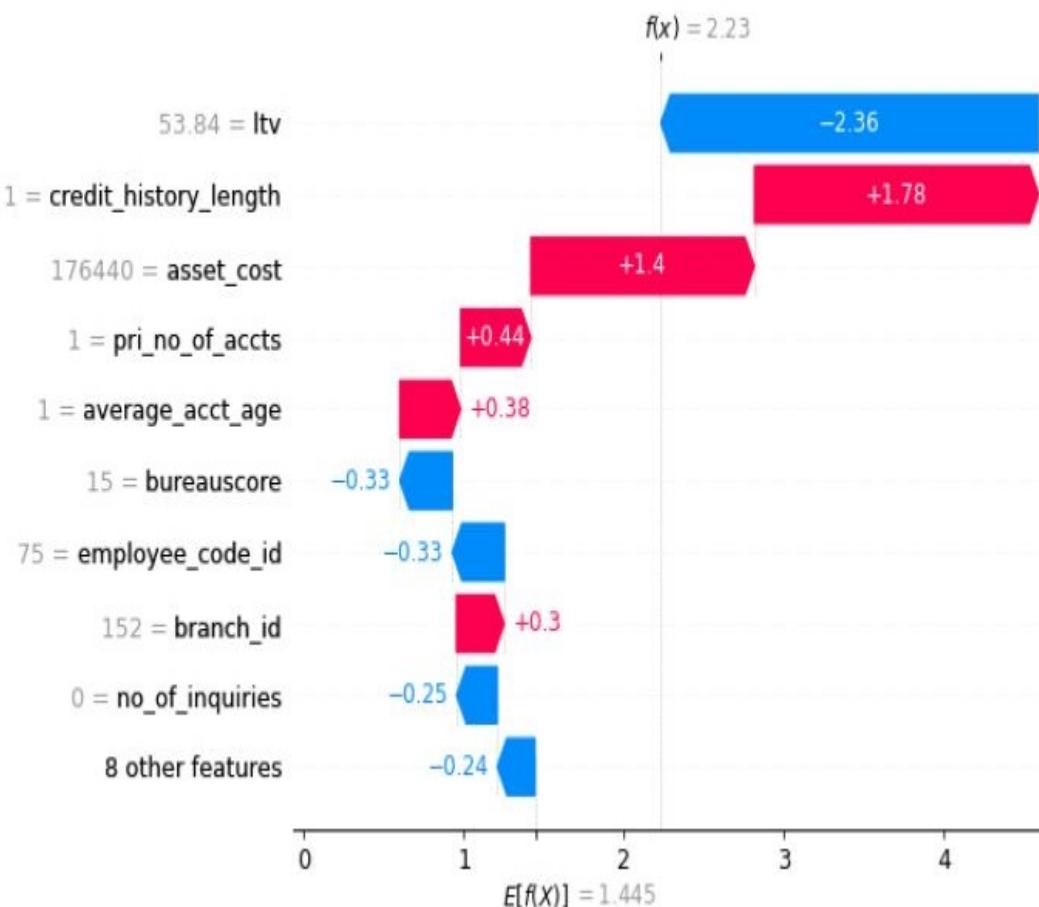
Question Number : 207 Question Id : 640653614560 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

In the following waterfall plot , identify the base value (explainer expected value):



Options :

6406532051625. ✗ + 2.23

6406532051626. ✓ + 1.445

6406532051627. ✗ - 2.36

6406532051628. ✗ +1.78

Question Number : 208 Question Id : 640653614561 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

tree_path_dependent is a “feature_perturbation” technique is used by default when there is no data provided to shap Tree explainer object.

Options :

6406532051629. ✗ FALSE

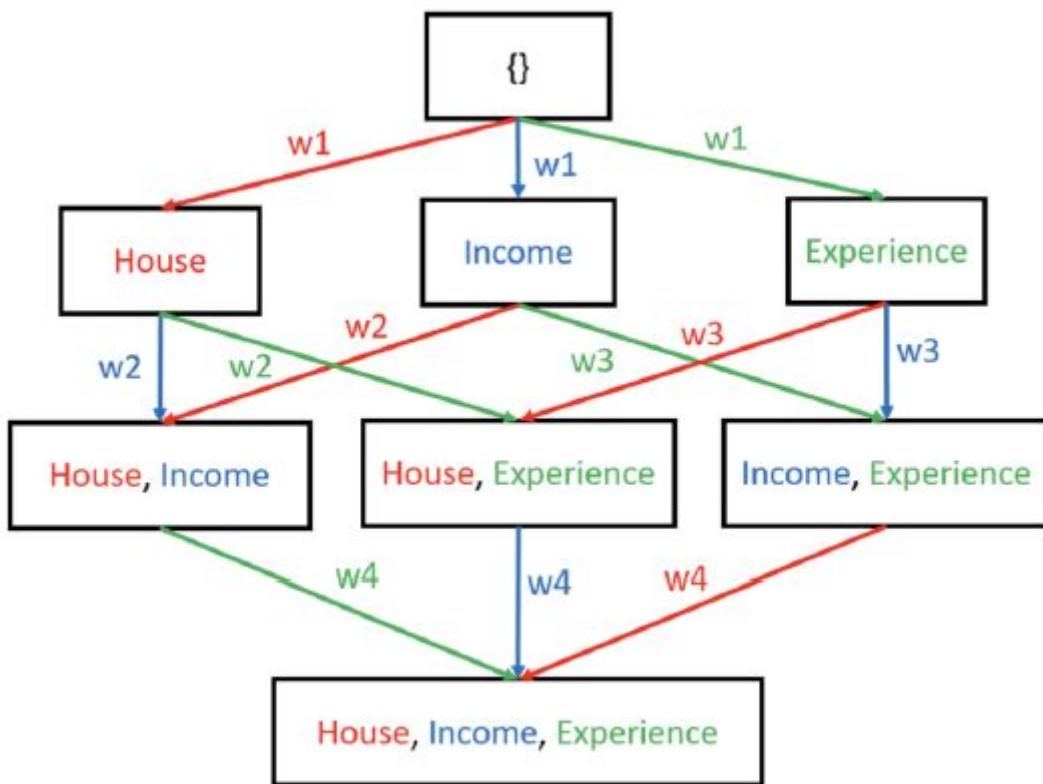
6406532051630. ✓ TRUE

Question Number : 209 Question Id : 640653614562 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

From the following feature powerset , evaluate the ‘w4’ , weight of the marginal coalition.



Options :

6406532051631. ✓ $\frac{1}{3}$

6406532051632. ✗ $\frac{1}{4}$

6406532051633. ✗ $\frac{1}{5}$

6406532051634. ✗ $\frac{1}{6}$

Question Number : 210 Question Id : 640653614563 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

In the context of the Interaction Index, what is the significance of negative values?

Options :

6406532051635. ❌ Negative values indicate errors in the model's predictions.

6406532051636. ✓ Negative values indicate that the interaction between the features has a negative impact on predictions.

6406532051637. ❌ Negative values indicate a weak correlation between the features.

6406532051638. ❌ Negative values indicate that the Shapley values are incorrectly computed.

PSM

Section Id :	64065341432
Section Number :	9
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	5
Number of Questions to be attempted :	5
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 :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	64065388923
Question Shuffling Allowed :	No
Is Section Default? :	null

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : PRIVACY & SECURITY IN ONLINE SOCIAL MEDIA (PEN AND PAPER 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 :

6406532051639. ✓ YES

6406532051640. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 64065388924

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 212 Question Id : 640653614565 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

[5 * 1 mark = 5]

Q1. Name any two Validity of Social Data Research.

Q2. What is BERT?

Q3. Mention any four PII's.

Q4. What is the role of event discriminator in EANN?

Q5. What are the categories of image misinformation?

Options :

6406532051641. ✓ I have written answers on the answer sheets

6406532051642. ✗ Not applicable

Sub-Section Number : 3

Sub-Section Id : 64065388925

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 213 Question Id : 640653614566 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 22

Question Label : Multiple Choice Question

[11* 2 marks =22]

Q6. Explain the different types of Bias at data source.

Q7. Draw the Framework for ethical research with social media data.

Q8. What is emotional contagion? Mention the behavior of the control group with positivity and negativity.

Q9. Draw conceptual framework for survey to address parental privacy concerns for their teens and different parental mediation strategies influence teen privacy concerns, privacy risk-taking and risk coping privacy behaviors in social media.

Q10. What is COPPA? Mention any one example of violation of COPPA in the class.

Q11. What are the Westin's 4 states of Privacy?

Q12. What is CredEye? Explain its working.

Q13. Define hate speech and how will you classify the hate speech on social media?

Q14. With respect to the Information Credibility on Twitter, give two examples of each following features:

- (a) Message Based Features
- (b) User Based Features

Q15. Mention machine learning approaches for text classifier for abuse detection.

Q16. What is a bot and how did twitter bot effect elections? Which API (as discussed in the lectures) is used to differentiate between bots and humans?

Options :

6406532051643. ✓ I have written answers on the answer sheets

6406532051644. ✗ Not applicable

Sub-Section Number : 4

Sub-Section Id : 64065388926

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 214 Question Id : 640653614567 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

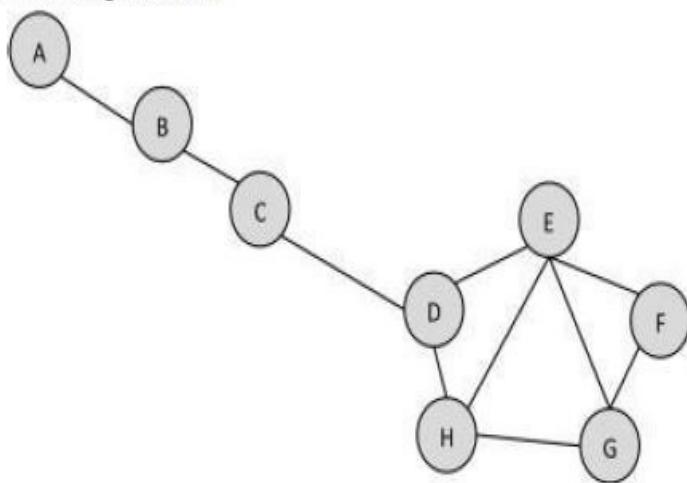
Correct Marks : 16

Question Label : Multiple Choice Question

[4* 4 marks = 16]

Q17. What are quasi-identifiers and how to counter linking attacks done using quasi-identifiers?

Q18. Consider the graph below and compute the average of shortest path length of node D and node A. Which centrality calculation would be used to do so and identify which node is more central among A and D?



Q19. Identify the fake news feature of the following fake news as discussed in class:

- a) Fake news shared over two million times on social media during lok sabha polls.
- b) Religious tension in India is aggravated by coronavirus.
- c) A single volcanic eruption releases more carbon dioxide into the Earth's atmosphere than humanity has since the Industrial revolution
- d) Acai berry diet recipe exposed: Miracle diet recipe or scam?

Q20. Differentiate between news satire and news parody with appropriate example of each as discussed in class.

Options :

6406532051645. ✓ I have written answers on the answer sheets

6406532051646. ✗ Not applicable

Sub-Section Number : 5

Sub-Section Id : 64065388927

Question Shuffling Allowed : Yes

Is Section Default? :

null

Question Number : 215 Question Id : 640653614568 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 7

Question Label : Multiple Choice Question

[7 marks]

Q21. Write code for authentication to get the following from a twitter handle @ponguru.

- a) Show followers of the user **[1m]**
- b) Show user status' count **[1m]**
- c) Follow the user **[1m]**
- d) Get 200 tweets from user timeline **[1m]**
- e) Like tweets of @anupamaa12 and retweet her tweets **[2m]**
[1 mark for authentication code]

Options :

6406532051647. ✓ I have written answers on the answer sheets

6406532051648. ✗ Not applicable

RL

Section Id : 64065341433

Section Number : 10

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 :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	64065388928
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 216 Question Id : 640653614569 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : REINFORCEMENT LEARNING (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 :

6406532051649. ✓ YES

6406532051650. ✗ NO

Sub-Section Number :	2
Sub-Section Id :	64065388929
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 217 Question Id : 640653614570 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

In an MDP, three actions are possible from a state s . The optimal action values for two of these actions from this state are 1 and 2. If the optimal state value for s is 2, what could be said about the optimal action value for the other action from this state?

Options :

6406532051651. ✘ It has to be at least 2

6406532051652. ✘ It has to be at least 1

6406532051653. ✓ It has to be at most 2

6406532051654. ✘ It has to be at most 1

6406532051655. ✘ It has to be equal to 2

Question Number : 218 Question Id : 640653614571 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

What is the value of the following expression?

$$\sum_a \pi(a | s) \cdot \sum_{s',r} p(s', r | s, a) \left[r + \gamma \sum_{a'} \pi(a' | s') \cdot q_\pi(s', a') \right]$$

Options :

6406532051656. ✓ $v_\pi(s)$

6406532051657. ✗ $q_\pi(s, a)$

6406532051658. ✗ $v_*(s)$

6406532051659. ✗ $q_*(s, a)$

Question Number : 219 Question Id : 640653614572 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Select the most appropriate statement concerning the behaviour policy in Q-learning.

Options :

6406532051660. ✓ The behaviour policy in Q-learning **can be** an equiprobable random policy.

6406532051661. ✗ The behaviour policy in Q-learning **can be** a deterministic policy.

6406532051662. ✗ The behaviour policy in Q-learning **has to be** an ϵ -soft policy.

6406532051663. ✗ The behaviour policy in Q-learning **has to be** an ϵ -greedy policy.

Question Number : 220 Question Id : 640653614573 Question Type : MCQ Is Question

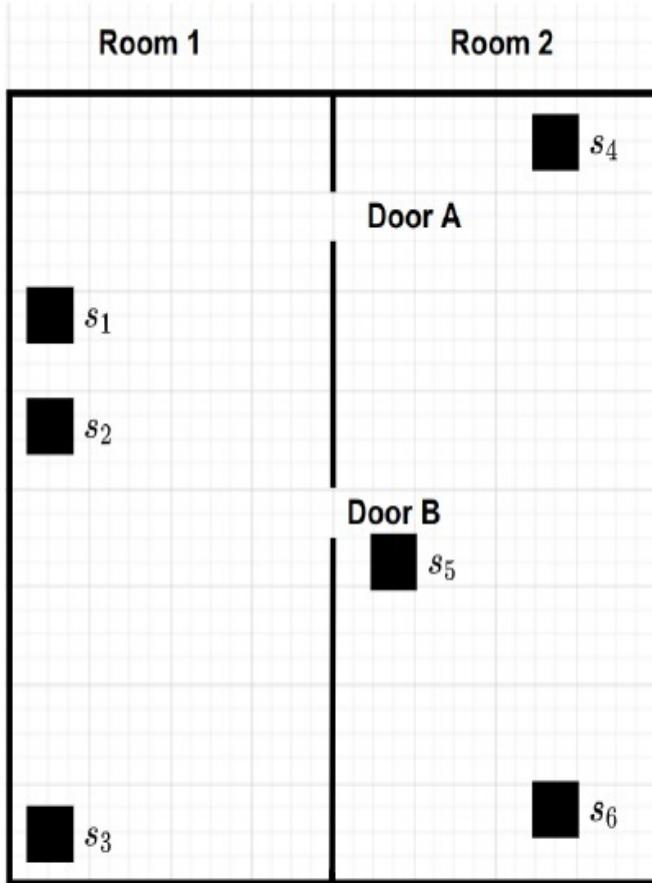
Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following grid world:



The grid world has two doors A and B and six specific states/positions s_1 to s_6 . π_1 represents the optimal policy to reach from *anywhere* in Room 1 to Room 2. At any state in the grid world, an agent can take only 4 actions (up, down, left, right), the actions that take the agent out of the grid world or on obstacles (i.e. walls) don't change the state. If an agent is trained from scratch, for which of the following, the agent will **NOT** follow policy π_1 to reach room 2?

Options :

6406532051664. ❌ Starting state: s_1 , goal state: s_4

6406532051665. ✓ Starting state: s_1 , goal state: s_5

6406532051666. ❌ Starting state: s_3 , goal state: s_6

6406532051667.

* Starting state: s_3 , goal state: s_5

Question Number : 221 Question Id : 640653614574 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Given a problem with a well defined hierarchy, what ordering would you expect on the total expected reward for a hierarchically optimal policy (H), a recursively optimal policy (R) and a flat optimal policy (F)?

Options :

6406532051668. * $R \leq F \leq H$

6406532051669. * $F \leq R \leq H$

6406532051670. ✓ $R \leq H \leq F$

6406532051671. * $F \leq H \leq R$

Question Number : 222 Question Id : 640653614575 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Which of the following corresponds to an update for the actor in the case of one-step actor-critic method?

Options :

$$\theta_{t+1} := \theta_t + \alpha \delta_t \frac{\nabla \pi(A_t | S_t, \theta_t)}{\pi(A_t | S_t, \theta_t)}$$

6406532051672. ✓

$$\theta_{t+1} := \theta_t + \alpha \frac{\nabla \pi(A_t | S_t, \theta_t)}{\pi(A_t | S_t, \theta_t)}$$

6406532051673. ✗

$$\theta_{t+1} := \theta_t + \alpha G_t \frac{\nabla \pi(A_t | S_t, \theta_t)}{\pi(A_t | S_t, \theta_t)}$$

6406532051674. ✗

$$\theta_{t+1} := \theta_t + \alpha \delta_t \nabla \pi(A_t | S_t, \theta_t)$$

6406532051675. ✗

Sub-Section Number : 3

Sub-Section Id : 64065388930

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 223 Question Id : 640653614576 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider a multi-armed bandit problem with 5 arms in which the softmax strategy is used to find the optimal arm. The temperature parameter is τ . Assume that the Q values have been estimated correctly for all five arms. Let π be the distribution induced by the softmax function over the arms. Select all true statements.

Options :

6406532051676. ✗ As $\tau \rightarrow 0$, π tends to an equiprobable random policy.

6406532051677.

✓ As $\tau \rightarrow 0$, π tends to a deterministic, greedy policy.

6406532051678. ✓ As $\tau \rightarrow \infty$, π tends to an equiprobable random policy.

6406532051679. ✘ As $\tau \rightarrow \infty$, π tends to a deterministic, greedy policy.

Sub-Section Number : 4

Sub-Section Id : 64065388931

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 224 Question Id : 640653614577 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Select all true statements.

Options :

6406532051680. ✓ Policy gradient methods use a parameterized policy that can select actions without consulting a value function.

6406532051681. ✘ Policy gradient methods **must** use a value function to learn the policy parameters.

6406532051682. ✘ According to the policy gradient theorem, computing the gradient of the performance requires the computation of the gradient of the state distribution $\mu(s)$.

6406532051683. ✓ In REINFORCE with baseline, the baseline **cannot** be a function of the actions.

Sub-Section Number : 5

Sub-Section Id : 64065388932

Question Shuffling Allowed : Yes

Is Section Default? :

null

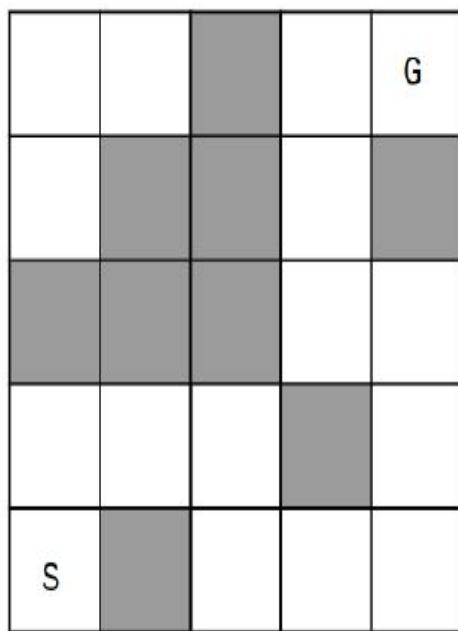
Question Number : 225 Question Id : 640653614578 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Consider the following grid-world in which all transitions are deterministic. S is the start state, G is the goal and the gray cells are obstructions.



The agent gets a reward of 10 when it reaches the goal state. For all other transitions, the reward is 0. Actions that take the agent out of the grid or into the obstructions leave the state unchanged.

If $\gamma = 0.9$, find the maximum possible return for the agent starting from state S . Enter your 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 :

0.30 to 0.33

Question Number : 226 Question Id : 640653614580 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Consider the following episodes with two non-terminal states A and B and a terminal state C .

Each row corresponds to one episode:

episode							
(1)	A	1	B	2	A	0	C
(2)	B	1	B	2	A	2	C
(3)	A	1	B	-1	A	-1	C
(4)	B	-1	B	2	A	3	C
(5)	A	0	A	1	A	3	C

What is the estimate of $V(B)$ using every-visit MC? $\gamma = 1$ for this problem.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

3

Question Number : 227 Question Id : 640653614581 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Consider a binary bandit, with policy described as follows:

$$\pi(a, \theta) = \begin{cases} \theta, & \text{if } a = 1 \\ 1 - \theta, & \text{if } a = 0 \end{cases}$$

At the beginning $\theta = 0.5$. What will be probability of pulling arm $a = 1$ after pulling arm $a = 1$ and receiving reward of +2. Assume baseline to be 0 and learning rate (ρ) to be 0.01.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.51

Question Number : 228 Question Id : 640653614582 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Consider a 4-armed bandit, with policy presented by softmax. Initially $\theta_i = 1$, $\forall i \in [1, 4]$. In the very first pull, arm 1 is pulled and the received reward is +4. What will be θ_2 after the update? Assume baseline to be 0 and learning rate (α) to be 0.1.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.9

Sub-Section Number : 6

Sub-Section Id : 64065388933

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 229 Question Id : 640653614579 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4

Question Label : Multiple Choice Question

Which of the following is the TD error used in the $TD(0)$ algorithm?

Options :

6406532051685. ❌ $R_{t+1} + \gamma V(S_t) - V(S_t)$

6406532051686. ✓ $R_{t+1} + \gamma V(S_{t+1}) - V(S_t)$

6406532051687. ❌ $R_{t+1} + \gamma [V(S_{t+1}) - V(S_t)]$

6406532051688. ❌ $V(S_{t+1}) - V(S_t)$

Sub-Section Number : 7

Sub-Section Id : 64065388934

Question Shuffling Allowed : No

Is Section Default? : null

Question Id : 640653614583 Question Type : COMPREHENSION Sub Question Shuffling

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

Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (230 to 231)

Question Label : Comprehension

Consider a **linear** function approximator in which the weight vector is in \mathbb{R}^5 .

To begin with, the weights are initialized to zero, $\mathbf{w}_0 = [0 \ 0 \ 0 \ 0 \ 0]^T$.

The first transition used to update the weights is given below:

$$S_0 = s_0$$

$$A_0 = a_0$$

$$R_1 = 10$$

$$S_1 = s_1$$

It is given that $\phi(s_0, a_0) = [1 \ 0 \ -1 \ 0 \ 1]^T$. Perform one update of semi-gradient TD with $\gamma = 0.9$ and $\alpha = 0.1$ to get \mathbf{w}_1 .

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 230 Question Id : 640653614584 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2.5

Question Label : Short Answer Question

Find the TD error for this transition.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 231 Question Id : 640653614585 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1.5

Question Label : Short Answer Question

Find the sum of the components of the vector \mathbf{w}_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 : 8

Sub-Section Id : 64065388935

Question Shuffling Allowed : No

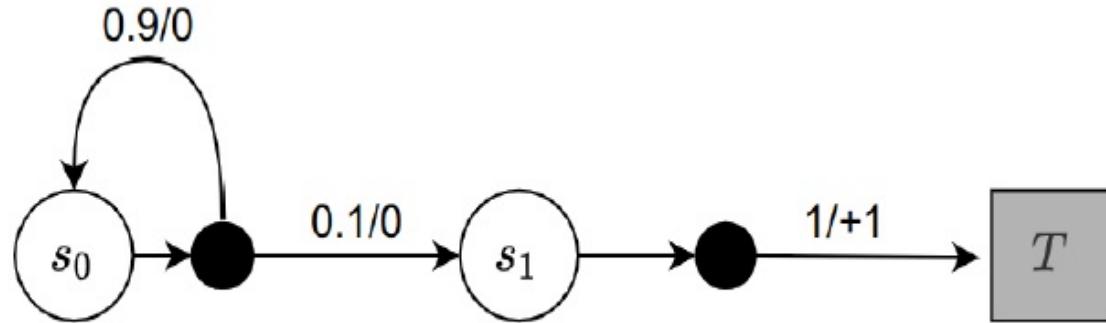
Is Section Default? : null

Question Id : 640653614586 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (232 to 233)

Question Label : Comprehension

Consider following MDP, assume $\lambda = 0.9, \gamma = 1$:



The edges have the value p/r , where p denotes the transition probability and r is the immediate expected reward. s_0, s_1 are non-terminal states and T is a terminal state.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 232 Question Id : 640653614587 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3.5

Question Label : Short Answer Question

What is the probability that the accumulating eligibility trace for state s_0 is more than 3 at the end of a trajectory?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.71 to 0.74

Question Number : 233 Question Id : 640653614588 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1.5

Question Label : Multiple Choice Question

If the eligibility traces are replacing in nature, which state would have highest eligibility trace at the end of a trajectory, and what will be the value of the eligibility trace of the corresponding state?

Options :

6406532051695. ✘ State with highest eligibility trace = s_0 and $e(s_0) = 1$

6406532051696. ✓ State with highest eligibility trace = s_1 and $e(s_1) = 1$

6406532051697. ✘ State with highest eligibility trace = s_0 and $e(s_0) = 0.9$

6406532051698. ✘ State with highest eligibility trace = s_1 and $e(s_1) = 0.9$

Statistical Computing

Section Id :	64065341434
Section Number :	11
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	6
Number of Questions to be attempted :	6
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 :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	64065388936
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 234 Question Id : 640653614589 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : STATISTICAL COMPUTING (PEN AND PAPER 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 :

6406532051699. ✓ YES

6406532051700. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 64065388937

Question Shuffling Allowed : No

Is Section Default? : null

Question Number : 235 Question Id : 640653614590 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

Use the following PDFs and PMFs if required:

- $X \sim \text{Geometric}(p)$, $P(X = k) = (1 - p)^{k-1}p$, for $k = 1, \dots, \infty$
- $X \sim \text{Geometric}(p)$, $P(X = k) = (1 - p)^k p$, for $k = 0, 1, \dots, \infty$
- $X \sim \text{Uniform}[a, b]$, $f_X(x) = \frac{1}{b - a}$, for $a \leq x \leq b$
- $X \sim \text{Exp}(\lambda)$, $f_X(x) = \lambda e^{-\lambda x}$, $x > 0$
- $X \sim \text{Normal}(\mu, \sigma^2)$, $f_X(x) = \frac{1}{\sigma\sqrt{2\pi}} \exp\left(\frac{-(x - \mu)^2}{2\sigma^2}\right)$, for $-\infty < x < \infty$
- $X \sim \text{Gamma}(\alpha, \beta)$, $f_X(x) = \frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}$, $x > 0, \alpha, \beta > 0$.
- $X \sim \text{Beta}(\alpha, \beta)$, $f_X(x) = \frac{\Gamma(\alpha + \beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1} (1 - x)^{\beta-1}$, $0 < x < 1, \alpha, \beta > 0$.
- $X \sim \text{Cauchy}(\mu, \lambda)$, $f_X(x) = \frac{1}{\pi} \left[\frac{\lambda}{\lambda^2 + (x - \mu)^2} \right]$, $\lambda > 0, x, \mu \in \mathbb{R}$

Options :

6406532051701. ✓ Useful Data has been mentioned above.

6406532051702. ❌ This data attachment is just for a reference & not for an evaluation.

Sub-Section Number : 3

Sub-Section Id : 64065388938

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 236 Question Id : 640653614591 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 30

Question Label : Multiple Choice Question

1. Let $X_1, X_2, \dots, X_n \sim \text{iid } F$, where F is a 2-component Exponential(λ) mixture distribution with density

$$f(x | \lambda_1, \lambda_2, \pi_1, \pi_2) = \pi_1 f_1(x | \lambda_1) + \pi_2 f_2(x | \lambda_2),$$

where $\lambda_1, \lambda_2 \geq 0$ and $\pi_1, \pi_2 \in (0, 1)$, $\pi_1 + \pi_2 = 1$. Suppose we want to obtain the maximum likelihood estimate of $\theta = (\pi_1, \pi_2, \lambda_1, \lambda_2)$ using the EM algorithm.

- (i) Recall that the E -step has the function:

$$Q(\theta | \theta_{(k)}) = E[\log f(x, z | \theta) | X = x, \theta = \theta_{(k)}]$$

Simplify this expression for the given likelihood. [6 marks]

- (ii) M -step:

$$(a) \text{ Show that } \lambda_{c,(k+1)} = \frac{\sum_{i=1}^n \gamma_{i,c,(k)}}{\sum_{i=1}^n x_i \gamma_{i,c,(k)}}. \quad [3 \text{ marks}]$$

$$(b) \text{ Show that } \pi_{c,(k+1)} = \frac{\sum_{i=1}^n \gamma_{i,c,(k)}}{n}. \quad [3 \text{ marks}]$$

$$(c) \text{ Show that } \lambda_{c,(k+1)}, \pi_{c,(k+1)} \text{ is the maxima of } q(\lambda, \pi | \lambda_{(k)}, \pi_{(k)}). \quad [2 \text{ marks}]$$

$$\text{, where } \gamma_{i,c,(k)} = \frac{f_c(x_i | \lambda_{c,(k)}) \pi_{c,(k)}}{\sum_{j=1}^c f_j(x_i | \lambda_{j,(k)}) \pi_{j,(k)}}$$

- (iii) Write the steps of the EM algorithm for the 2-component Exponential(λ) mixture distribution. [2 marks]

2. Consider a random variable X with the following cumulative distribution function:

$$F(x) = \frac{x^2 + x}{2}, \quad 0 \leq x \leq 1$$

- (a) Write down the steps of the Inverse transform method to sample from the given distribution. [3 marks]

- (b) Write down the steps for the Accept-reject to sample from this distribution. [7marks]

3. Suppose we want to estimate $\Pr(-1 < X < 1)$, where $X \sim \text{Normal}(0, 1)$ using the weighted importance sampling method. Let the importance proposal density be

$$g(x) = \frac{3x^2}{2}, \quad x \in [-1, 1]$$

If $\Pr(-1 < X < 1) = 2E_G\left(\frac{f(x)\tilde{f}(x)}{g(x)}\right)$, then find $\tilde{f}(x)$, where G denotes the distribution of $g(x)$. [4 marks]

Options :

6406532051703. ✓ I have written answers on the answer sheets

6406532051704. ✘ Not applicable

Sub-Section Number : 4

Sub-Section Id : 64065388939

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 237 Question Id : 640653614592 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 8

Question Label : Multiple Choice Question

4. Suppose we want to sample uniformly from a circle centered at 0 and radius 4 using the below proposal density:

$$g(x, y) = \frac{1}{4m^2} \mathbb{I}(-m < x < m) \mathbb{I}(-m < y < m)$$

For what values of m , will an accept reject algorithm be correct? Select all that apply.

[4 marks]

- (a) $m = 1$
- (b) $m = 4$
- (c) $m = 3$
- (d) $m = 10$

5. Which among the following distributions can be sampled using the Ratio-of-Uniform method?

[4 marks]

- (a) Beta (0.5, 0.5)
- (b) Standard Cauchy distribution
- (c) $f(x) = xe^{-1/x}, x > 0$
- (d) $f(x) = \frac{1}{x^2}, x \geq 1$

Options :

6406532051705. ✓ I have written answers on the answer sheets

6406532051706. ✗ Not applicable

Sub-Section Number : 5

Sub-Section Id : 64065388940

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 238 Question Id : 640653614593 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6

Question Label : Multiple Choice Question

6. Which among the following is true for an MM algorithm when applied to a minimization problem? [3 marks]

- (a) MM algorithm finds a majoring function and then minimize it at each iterate.
- (b) The algorithm is always guaranteed to converge to a global minima.
- (c) The algorithm always has the ascent property.
- (d) None of the above.

7. The optimal simple importance sampling proposal distribution for estimating the k th moment of a Gamma (α, β) distribution is Gamma($\alpha + k, \beta$). What is the variance of the resulting importance sampling estimator? [3 marks]

- (a) zero
- (b) α/β^2
- (c) $(\alpha + k)/\beta^2$

Options :

6406532051707. ✓ I have written answers on the answer sheets

6406532051708. ✗ Not applicable

Sub-Section Number : 6

Sub-Section Id : 64065388941

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 239 Question Id : 640653614594 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6

Question Label : Multiple Choice Question

8. The below code runs an optimization procedure.

```
generate <- function(n, mu) {  
  sequence <- runif(n)  
  return(tan(pi*(sequence - 0.5)) + mu)  
}  
  
objective <- function(mu, X)  
{  
  n <- length(X)  
  rtn <- -n*log(pi) - sum(log(1 + (X - mu)^2))  
  return(rtn)  
}  
  
# Function that implements the optimization  
objectivefunc <- function(X, steps = 1000, tol = 1e-5, jump = 0.002)  
{  
  current <- 20  
  diff <- 100  
  iter <- 0  
  while( (diff > tol) && iter < steps)  
  {  
    iter <- iter + 1  
    update <- current + jump*sum(2*(X - current)/(1 + (X-current)^2))  
    diff <- abs(current - update)  
    current <- update  
  }  
  return(list("iter" = iter, "approx" = current))  
}  
  
X <- generate(1000, 10)  
output <- objectivefunc(X)  
  
output$approx  
[1] 9.994792
```

Study the code carefully and answer the below questions:

- (i) Select the optimization procedure that is being implemented here. [3 marks]
- (a) Newton Raphson
 - (b) Gradient ascent
 - (c) MM algorithm
 - (d) EM algorithm
- (ii) What does `output$approx` represent here? Comment. [3 marks]

Options :

6406532051709. ✓ I have written answers on the answer sheets

6406532051710. ✗ Not applicable

Advanced Algorithms

Section Id :	64065341435
Section Number :	12
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	21
Number of Questions to be attempted :	21
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 :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	64065388942
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 240 Question Id : 640653614595 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : ADVANCED ALGORITHMS (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 :

6406532051711. ✓ YES

6406532051712. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 64065388943

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 241 Question Id : 640653614596 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Recall the Dance Class problem:

Problem Definition

Dance Classes

Input: A collection of n intervals given by their left and right endpoints $(s_1, f_1), \dots, (s_n, f_n)$, where $s_i < f_i$ for all $1 \leq i \leq n$.

Question: What is the size of the largest collection of mutually pairwise non-overlapping intervals?



On which of the following instances will this algorithm produce a suboptimal answer?

Instance 1:

The number of classes is $N = 4$

The timings of the classes are given by:

1 - 5
3 - 7
6 - 9
8 - 10

Instance 2:

The number of classes is $N = 4$

The timings of the classes are given by:

2 - 5
6 - 10
11 - 15
1 - 10

Instance 3:

The number of classes is $N = 4$

The timings of the classes are given by:

1 - 5
6 - 8
9 - 11
12 - 15

Options :

6406532051713. ❌ Instance 1

6406532051714. ✓ Instance 2

6406532051715. ❌ Instance 3

6406532051716. ❌ None of these

Question Number : 242 Question Id : 640653614615 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Let $A \leq_P B$ be notation to denote that there is a polynomial-time reduction from A to B . Let X_1 and X_2 be decision problems in \mathcal{NP} , and assume $\mathcal{P} \neq \mathcal{NP}$. Is the following statement:

If $X_1 \leq_P X_2$ and $X_2 \leq_P X_1$, then both X_1 and X_2 are NP-complete.

true or false?

Options :

6406532051751. ✘ TRUE

6406532051752. ✓ FALSE

Question Number : 243 Question Id : 640653614616 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

True or false?

If the Vertex Cover problem turns out to be in P, then SAT is also in P.

Options :

6406532051753. ✓ TRUE

6406532051754. ✘ FALSE

Question Number : 244 Question Id : 640653614617 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

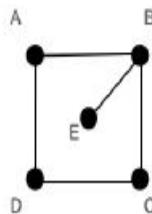
Time : 0

Correct Marks : 3

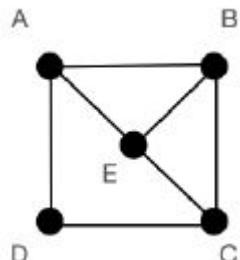
Question Label : Multiple Choice Question

Consider the following polynomial time reduction from the problem MAX CLIQUE to the problem MAX INDEPENDENT SET: we take an instance (G, k) of MAX CLIQUE as input and return the instance (H, k) , where H is the complement of G . It can be checked that these instances are equivalent.

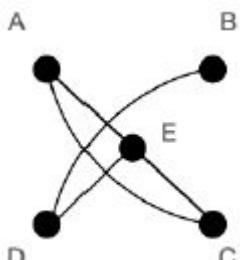
If the source graph G is as shown below on the top (with vertices A, B, C, D and E), then which option shows the graph H ?



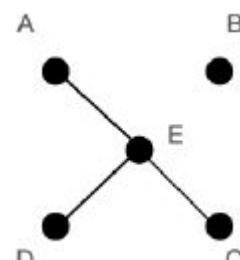
Options :



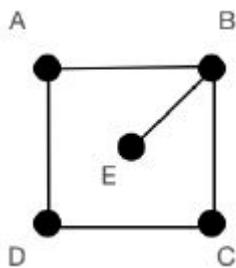
6406532051755. ✘



6406532051756. ✓



6406532051757. ✘



6406532051758. ✖

Question Number : 245 Question Id : 640653614621 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Raj and Lata both designed an algorithm for the same minimization problem.

Raj proved that his algorithm Alg1 is a 5-approximation algorithm.

Lata proved that her algorithm Alg2 is a 10-approximation algorithm.

Is the following statement true or false?

| For all inputs I we have $\text{Alg1}(I) \leq 5 \cdot \text{Alg2}(I)$.

Recall that to say that a problem has a c -approximation algorithm for some constant c means that the output of the algorithm is always at most $c \cdot \text{OPT}(I)$ on all inputs I .

Options :

6406532051766. ✓ TRUE

6406532051767. ✖ FALSE

Question Number : 246 Question Id : 640653614622 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Recall the max-flow problem: for a directed graph $G(V, E)$ with non-negative capacities c_e for every $e \in E$ and two special vertices s (source, with no incoming edges) and t (sink, with no outgoing edges), a flow in G is an assignment $f: E \rightarrow \mathbb{R}_{\geq 0}$ such that $f_e \leq c_e$ for every edge and for every vertex $v \in V$, $\sum_{(u,v) \in E} f((u,v)) = \sum_{(v,u) \in E} f((v,u))$. The task is to find a maximum flow f i.e., a flow f such that $\sum_{(s,u) \in E} f((s,u))$ is maximized.

Given an instance $(G; s, t, c)$, we attempt here to design a LP whose optimal value is equal to the maximum flow in the graph G . There is a variable x_{uv} for all $(u, v) \in E$. Note that for any pair of vertices that is not an edge, we do not introduce any variable corresponding to it.

$$\begin{aligned} & \max \sum_u x_{ut} \\ & \forall e = (u, v) \in E, x_{uv} \leq c_e \\ & \forall v \notin \{s, t\}, \sum_u x_{uv} = \sum_w x_{vw} \\ & \forall e = (u, v) \in E, f(x_{uv}) \geq 0 \end{aligned}$$

Is the LP above a valid formulation for computing the maximum flow in G ?

Options :

6406532051768. ✓ Yes, this is a valid set of constraints.

6406532051769. ✗ No, the sum in the objective function should be taken only over neighbors of u .

6406532051770. ✗ No, the sum in the second constraint should be taken only over in-neighbors of v and out-neighbors of v , respectively.

Question Number : 247 Question Id : 640653614633 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

For a simple undirected graph $G = (V, E)$ on n vertices $V := \{v_1, \dots, v_n\}$ and m edges $E := \{e_1, \dots, e_m\}$, define $A_i \subseteq E$ as the subset of edges that have exactly one edge incident on v_i . In other words, a subset of edges F belongs to A_i if the vertex v_i has degree one in the subgraph $H = (V, F)$. What can we say if $|\cap_{i=1}^n A_i| > 0$?

Options :

6406532051800. ✘ G is connected.

G has a subset of edges $F \subseteq E$ such that every connected component of the
6406532051801. ✓ subgraph $H = (V, F)$ is an edge.

G has a subset of edges $F \subseteq E$ such that every connected component of the
6406532051802. ✘ subgraph $H = (V, F)$ is a cycle.

Sub-Section Number : 3

Sub-Section Id : 64065388944

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 248 Question Id : 640653614597 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Recall the Dance Class problem:

Problem Definition

Dance Classes

Input: A collection of n intervals given by their left and right endpoints $(s_1, f_1), \dots, (s_n, f_n)$, where $s_i < f_i$ for all $1 \leq i \leq n$.

Question: What is the size of the largest collection of mutually pairwise non-overlapping intervals?



Consider the greedy approach to the problem where we repeat the following until there are no intervals left:

select the interval with -----, eliminating ties arbitrarily; add it to our solution and eliminate all overlapping intervals.

Which of the following strategies guarantees an optimal result?

Options :

6406532051717. ✘ the shortest duration

6406532051718. ✘ the fewest overlaps with other intervals

6406532051719. ✘ the smallest left endpoint (i.e, a class that starts earliest)

6406532051720. ✓ the smallest right endpoint (i.e, a class that finishes earliest)

Sub-Section Number : 4

Sub-Section Id : 64065388945

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 249 Question Id : 640653614598 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

Recall the Stable Matching problem:

Problem Definition

Stable Matching

Input: Two sets given by

- $M = \{m_1, \dots, m_n\}$ (the men) and
- $W = \{w_1, \dots, w_n\}$ (the women);

and two collections of rankings

- $\{\sigma_1, \dots, \sigma_n\}$ (the ranking of the men over the women) and
- $\{\tau_1, \dots, \tau_n\}$ (the ranking of the women over the men),

where for all $1 \leq i \leq n$, σ_i is a strict ranking over W and τ_i is a strict ranking over M .

Question: Find a permutation π over $\{1, \dots, n\}$ such that $\{m_i, w_{\pi(i)}\}_{i \in [n]}$ is a stable matching.



For completeness, we recall the definition of a stable matching.

Consider the matching $M := \{m_i, w_{\pi(i)}\}$ given by a permutation π of $[n]$. A pair (m_k, w_ℓ) is said to be a blocking pair with respect to M if:

- $\ell \neq \pi(k)$,
- w_ℓ is ranked higher than $w_{\pi(k)}$ in σ_i ,
- m_k is ranked higher than m_q in τ_ℓ , where $\pi(q) = \ell$;

in other words, m_k and w_l are not matched by M , and they rank each other higher than their respective matched partners in M .

If M is a matching for which there are no blocking pairs with respect to M , then M is said to be a stable matching.

Consider the following instance of the stable matching problem for 4 men (PQRS) and 4 women (WXYZ).

P: W > X > Y > Z

Q: X > Y > Z > W

R: W > X > Z > Y

S: X > Y > W > Z

And

W: S > Q > R > P

X: P > S > Q > R

Y: R > P > Q > S

Z: R > P > S > Q

Is the matching $M = \{(P, W), (Q, X), (R, Z), (S, Y)\}$ stable?

Options :

6406532051721. ✘ TRUE

6406532051722. ✓ FALSE

Sub-Section Number : 5

Sub-Section Id : 64065388946

Question Shuffling Allowed : No

Is Section Default? : null

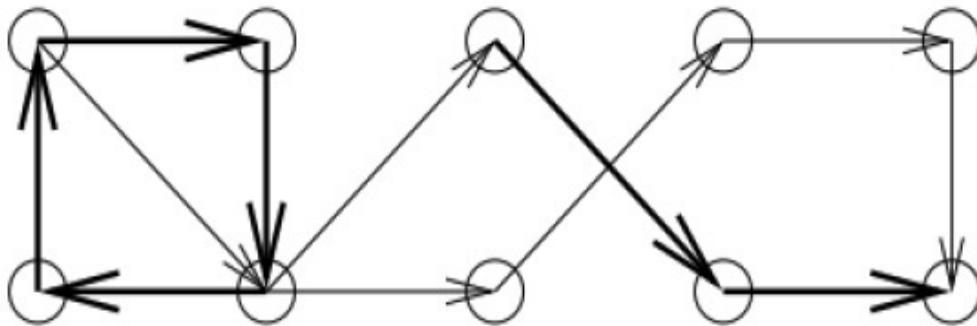
Question Id : 640653614599 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Question Numbers : (250 to 254)

Question Label : Comprehension

Consider a directed graph $G = (V, A)$.

A **1-factor** of G is a subset $F \subseteq A$ of arcs (i.e. directed edges) of G such that the indegree (the number of incoming edges) and outdegree (the number of outgoing edges) of every vertex in the subgraph $H = (V, F)$ is at most 1.

Here is an example of a 1-factor (the thick edges).



An **outgoing 1/2-factor** of G is a subset $F_1 \subseteq A$ of arcs (i.e. directed edges) of G such that the outdegree (the number of outgoing edges) of every vertex in the subgraph $H_1 = (V, F_1)$ is at most 1.

An **incoming 1/2-factor** of G is a subset $F_2 \subseteq A$ of arcs (i.e. directed edges) of G such that the indegree (the number of incoming edges) of every vertex in the subgraph $H_2 = (V, F_2)$ is at most 1.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 250 Question Id : 640653614600 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Is the collection of outgoing 1/2-factors over the set A a matroid?

Options :

6406532051723. ✓ Yes

6406532051724. ✗ No

Question Number : 251 Question Id : 640653614601 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Is the collection of incoming 1/2-factors over the set A a matroid?

Options :

6406532051725. ✓ Yes

6406532051726. ✗ No

Question Number : 252 Question Id : 640653614602 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Is the collection of 1-factors over the set A a matroid?

Options :

6406532051727. ✗ Yes

6406532051728. ✓ No

Question Number : 253 Question Id : 640653614603 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Can the collection of 1-factors be defined as the intersection of two matroids?

Options :

6406532051729. ✓ Yes

6406532051730. ✘ No

Question Number : 254 Question Id : 640653614604 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Let $M_1 = (U, F_1)$ and $M_2 = (U, F_2)$ be two matroids. Is M defined as $(U, F_1 \cap F_2)$ also a matroid?

Options :

6406532051731. ✘ Yes

6406532051732. ✓ No

Question Id : 640653614609 Question Type : COMPREHENSION Sub Question Shuffling

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

Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (255 to 259)

Question Label : Comprehension

The memory of Bob's computer contains two interesting things: an array of integers and a virus. Each midnight the virus becomes active. It takes each array in memory and replaces it with a bunch of new arrays: one for each contiguous subarray of the original array.

For example, if today the memory contains a single array $(1, 2, 1, 3)$, tomorrow it will contain the following arrays:

$(1), (2), (1), (3), (1, 2), (2, 1), (1, 3), (1, 2, 1), (2, 1, 3), (1, 2, 1, 3)$.

As another example, if today the memory contains a single array $\{(7, 7)\}$, tomorrow it will contain the following arrays: $\{(7), (7), (7, 7)\}$, and the day after tomorrow it will contain the following arrays:
 $\{(7), (7), (7), (7), (7, 7)\}$, and so on.

You are given Bob's original array A and the number of days D. Let $f(A, D)$ be the sum of all elements of all arrays that will be in the memory of Bob's computer after D days. Our goal is to calculate $f(A, D)$. You may assume that the memory of Bob's computer is sufficiently large to accommodate all the arrays.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 255 Question Id : 640653614610 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Short Answer Question

If $A = (1, 2, 1, 3)$ and $D = 1$, what is $f(A, D)$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

Question Number : 256 **Question Id :** 640653614611 **Question Type :** SA **Calculator :** None

Response Time : N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 2

Question Label : Short Answer Question

If $A = (500)$ and $D = 120$, what is $f(A, D)$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

500

Question Number : 257 **Question Id :** 640653614612 **Question Type :** SA **Calculator :** None

Response Time : N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 2

Question Label : Short Answer Question

If $A = (1, 2)$ and $D = 10$, what is $f(A, D)$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

33

Question Number : 258 **Question Id :** 640653614613 **Question Type :** SA **Calculator :** None

Response Time : N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 2

Question Label : Short Answer Question

If A has four elements, how many arrays of length one are there after two steps?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

20

Question Number : 259 **Question Id :** 640653614614 **Question Type :** MCQ **Is Question**

Mandatory : No **Calculator :** None **Response Time :** N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 2

Question Label : Multiple Choice Question

Suppose we store, for every pair of indices $1 \leq i \leq j \leq N$, the number of times the subarray $A[i:j]$ (i, j inclusive) appears in the memory of Bob's computer on a particular day. Specifically, let $T[i,j,d]$ denote the number of occurrences of $A[i:j]$ in the set of arrays generated after d days. Then:

Options :

6406532051747. ❌ $T[i,j,d+1] = \max_{p,q|p \leq i, q \geq j} T[p,q,d]$

6406532051748. ✓ $T[i,j,d+1] = \sum_{p,q|p \leq i, q \geq j} T[p,q,d]$

6406532051749. ❌ $T[i,j,d+1] = \sum_{1 \leq k \leq d} T[i,j,k]$

$T[i, j, d + 1]$ cannot be computed from
6406532051750. ✖ values of $T[i, j, d]$.

Sub-Section Number :	6
Sub-Section Id :	64065388947
Question Shuffling Allowed :	Yes
Is Section Default? :	null

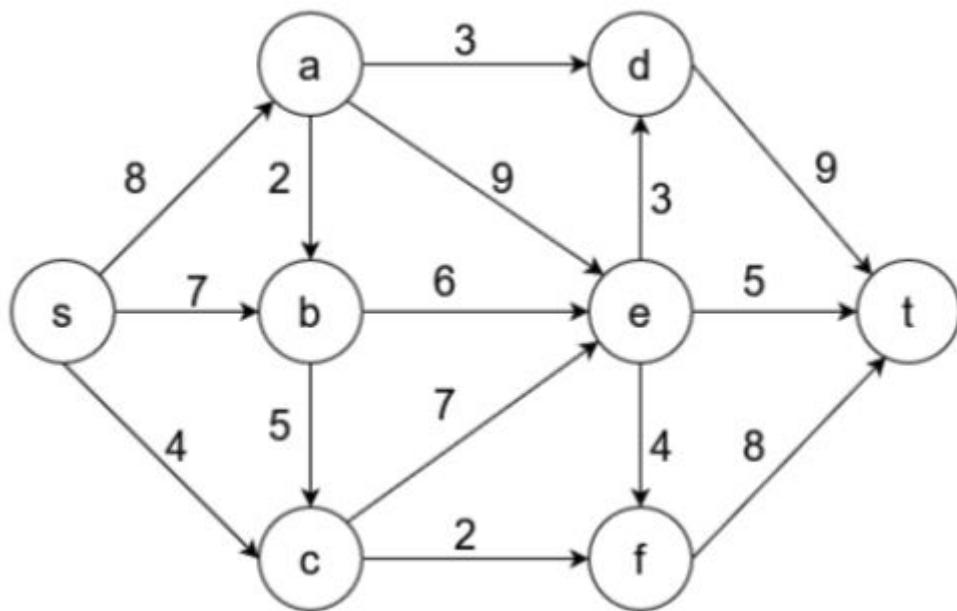
Question Number : 260 Question Id : 640653614605 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Short Answer Question

Consider the network given below with source s and sink t, with the numbers on the edges denoting maximum capacity across a particular edge.



The value of the maximum flow in the given network is: _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

17

Question Number : 261 Question Id : 640653614608 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Short Answer Question

You are supposed to start at the top of a number triangle and chose your passage all the way down by selecting between the numbers below you to the immediate left or right. Your goal is to maximize the sum of the elements lying in your path.

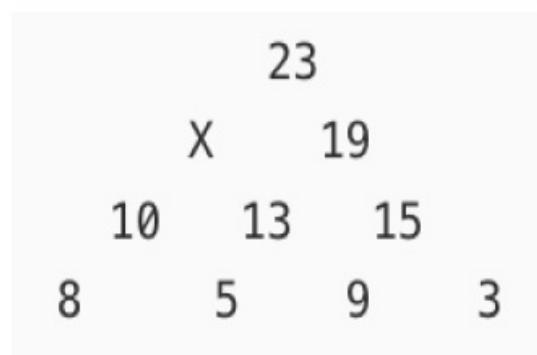
For example, in the triangle below, the red path maximizes the sum.



A bottom-up dynamic programming solution is to allocate a number triangle that stores the maximum reachable sum if we were to start from that position. It is easy to compute the number triangles from the bottom row onward using the fact that:

```
best from this point = this point +  
max(best from the left, best from the right)
```

The figure below shows the values calculated by this DP approach. For example, the leftmost number on the second row from the bottom comes from the calculation that the best path rooted at that location is $\max(2+8, 2+5) = 10$.



What is the value of X?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

Sub-Section Number :	7
Sub-Section Id :	64065388948
Question Shuffling Allowed :	Yes
Is Section Default? :	null

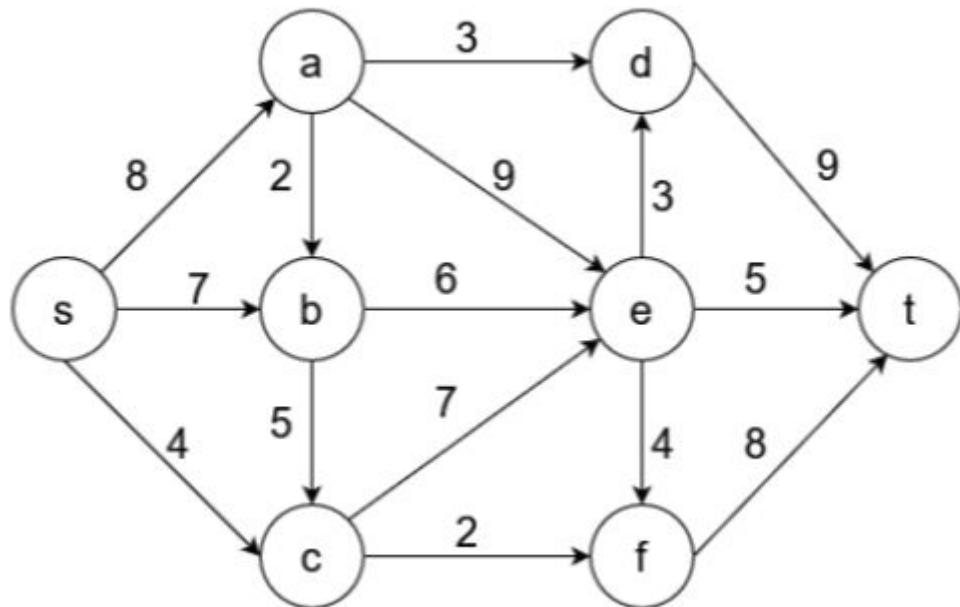
Question Number : 262 Question Id : 640653614606 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

Consider the network given below with source s and sink t, with the numbers on the edges denoting maximum capacity across a particular edge.



Which of the following edges form a valid min-cut in the given network?

Options :

6406532051734. ✓ Edges {ad, ed, et, ef, cf}

6406532051735. ✗ Edges {ad, ae, be, ce, cf}

6406532051736. ✗ Edges {ad, ed, et, ft}

6406532051737. ✘ Edges {dt, ed, et, ef, cf}

Question Number : 263 Question Id : 640653614607 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

Consider the following orientation problem.

We are given an undirected graph $G = (V, E)$ and integer values $p(v)$ for every vertex $v \in V$. We would like to know if we can orient the edges of G such that the directed graph we obtain has at most $p(v)$ arcs incoming to v (the 'in-degree requirements').

In other words, for each edge $\{u, v\}$, we have to decide whether to orient it as (u, v) or as (v, u) , and we would like at most $p(v)$ arcs to be oriented towards v .

This problem is:

Options :

6406532051738. ✘ NP-hard because there is a polynomial-time reduction to SAT

6406532051739. ✘ NP-hard because there is a polynomial-time reduction to MaxFlow

6406532051740. ✓ in P because there is a polynomial-time reduction to MaxFlow

6406532051741. ✘ in P because there is a polynomial-time reduction to SAT

Sub-Section Number : 8

Sub-Section Id : 64065388949

Question Shuffling Allowed : No

Is Section Default? : null

Question Id : 640653614618 Question Type : COMPREHENSION Sub Question Shuffling

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

Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (264 to 265)

Question Label : Comprehension

Recall that a proper 5-coloring of a graph G is a function that assigns each vertex of G a "color" from the set $\{0,1,2,3,4\}$, such that for any edge uv , vertices u and v are assigned different "colors". A proper 5-coloring is called *careful* if the colors assigned to adjacent vertices are not only distinct, but differ by more than 1 (mod 5).

Based on the above data, answer the given subquestions.

Sub questions

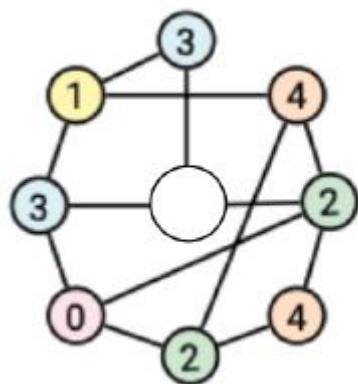
Question Number : 264 Question Id : 640653614619 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the partially carefully properly 5-colored graph below. What color should we give the vertex in the center to extend this to a complete careful proper 5-coloring?



Options :

6406532051759. ✓ 0

6406532051760. ✗ 1

6406532051761. ✗ 2

6406532051762. ✗ 3

6406532051763. ✘ 4

Question Number : 265 Question Id : 640653614620 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Is this problem NP-complete? Hint. You may assume that determining if a graph G has a proper 5-coloring is NP-complete.

Options :

6406532051764. ✓ Yes

6406532051765. ✘ No

Sub-Section Number : 9

Sub-Section Id : 64065388950

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 266 Question Id : 640653614623 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4

Question Label : Multiple Choice Question

In the Uncapacitated Facility Location (UCFL) problem, we are given $(\mathcal{F} \cup \mathcal{D}, d)$ as well auxiliarly information which specifies the cost f_i of opening a facility at location $i \in \mathcal{F}$. The goal is to open a subset of facilities in \mathcal{F} to minimize the sum of the cost of the opened facilities and the total distance traveled by the clients to their nearest open facility.

In other words we want to solve

$$\min_{\mathcal{F}' \subseteq \mathcal{F}} \left(\sum_{i \in \mathcal{F}} f_i + \sum_{j \in \mathcal{D}} d(j, \mathcal{F}') \right).$$

Consider the following LP formulation for the problem. We use a variable y_i for $i \in \mathcal{F}$ to indicate whether i is opened or not. We use a variable $x_{i,j}$ to indicate whether j is assigned to i . One set of constraints are natural here: each client has to be assigned/connected to a facility. The other constraint requires that j is assigned to i only if i is open.

Consider the LP below:

$$\begin{aligned} \min \sum_{i \in \mathcal{F}} f_i y_i + \sum_{j \in \mathcal{D}} \sum_{i \in \mathcal{F}} d(i, j) x_{i,j} \\ \sum_i x_{i,j} = Q \quad \forall j \in \mathcal{D} \\ x_{i,j} \leq y_i \quad i \in \mathcal{F}, j \in \mathcal{D} \\ x, y \geq 0 \end{aligned}$$

What is the correct value of Q?

Options :

6406532051771. ✘ 0

6406532051772. ✓ 1

6406532051773. ✘ 2

Sub-Section Number : 10

Sub-Section Id : 64065388951

Question Shuffling Allowed : No

Is Section Default? : null

Question Id : 640653614624 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (267 to 270)

Question Label : Comprehension

Consider the followed randomized algorithm, which prints out some number of smiley faces (:) and some number of asterisks (*) :

```
def randomizedSmiles (A):
    n = len(A)
    if n ≤ 1:
        print ":)"
        return
    for i in {0,...,n-1}:
        print "*"
    Choose a uniformly random integer p in {1, \ldots, n-1}
    randomizedSmiles(A[:p])
    randomizedSmiles (A[p:])
```

For the following parts, choose the **tightest** big-Oh bound that applies.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 267 Question Id : 640653614625 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

What is the expected number of
:) 's that randomizedSmiles
prints out?

Options :

6406532051774. ✘ $O(1)$

6406532051775. ✘ $O(\log n)$

6406532051776. ✓ $O(n)$

6406532051777. ✘ $O(n \log n)$

6406532051778. ✘ $O(n^2)$

Question Number : 268 Question Id : 640653614626 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

What is the maximum number of :)'s
that randomizedSmiles can print
out, if you got to choose how p
is selected?

Options :

6406532051779. ✘ $O(1)$

6406532051780. ✘ $O(\log n)$

6406532051781. ✓ $O(n)$

6406532051782. ✘ $O(n \log n)$

6406532051783. ✘ $O(n^2)$

Question Number : 269 Question Id : 640653614627 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

What is the expected number of *'s
that randomizedSmiles prints out?

Options :

6406532051784. ✘ $O(1)$

6406532051785. ✘ $O(\log n)$

6406532051786. ✘ $O(n)$

6406532051787. ✓ $O(n \log n)$

6406532051788. ✘ $O(n^2)$

Question Number : 270 Question Id : 640653614628 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

What is the maximum number of *'s
that randomizedSmiles can print
out, if you got to choose how p
is selected?

Options :

6406532051789. ✘ $O(1)$

6406532051790. ✘ $O(\log n)$

6406532051791. ✘ $O(n)$

6406532051792. ✘ $O(n \log n)$

6406532051793. ✓ $O(n^2)$

Sub-Section Number : 11

Sub-Section Id : 64065388952

Question Shuffling Allowed : No

Is Section Default? : null

Question Id : 640653614629 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Question Numbers : (271 to 273)

Question Label : Comprehension

For a simple undirected graph G on n vertices $\{v_1, \dots, v_n\}$, the adjacency matrix A_G is a $n \times n$ matrix defined as follows:

- $A_G[i][j] = 1$ if $(v_i, v_j) \in E(G)$
- $A_G[i][j] = 0$ if $(v_i, v_j) \notin E(G)$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 271 Question Id : 640653614630 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Since G is a simple graph (i.e., there are no multiple edges), the diagonal entries of A are:

Options :

6406532051794. ✓ 0

6406532051795. ✗ 1

Question Number : 272 Question Id : 640653614631 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Since G is an undirected graph, A_G is:

Options :

6406532051796. ✓ Symmetric (i.e., $A_G[i][j] = A_G[j][i]$)

6406532051797. ✗ Singular (i.e., A_G has zero determinant)

Question Number : 273 Question Id : 640653614632 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

The value of $A^2[i][i]$ is:

Options :

6406532051798. * 0

6406532051799. ✓ the degree of v_i

Sub-Section Number : 12

Sub-Section Id : 64065388953

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 274 Question Id : 640653614634 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 4

Question Label : Multiple Choice Question

Recall the Traveling Salesman Problem:

Definition

Traveling Salesman Problem

Input: A set of distinct cities $\{c_1, c_2, \dots, c_n\}$ and for each pair $c_i \neq c_j$, the distance between c_i and c_j , denoted by $d(c_i, c_j)$, and a budget k .

Question: Determine if there is a permutation π of $\{1, 2, \dots, n\}$, such that the following sum:

$$\sum_{i=1}^{n-1} d(c_{\pi(i)}, c_{\pi(i+1)}) + d(c_{\pi(n)}, c_{\pi(1)})$$

is at most k .

◀

The dynamic programming algorithm for TSP computes for every pair (S, c_i) , where S is a nonempty subset of $\{c_2, c_3, \dots, c_n\}$ and $c_i \in S$, the value $OPT[S, c_i]$ which is the minimum length of a tour which starts in c_1 , visits all cities from S and ends in c_i . We compute the values $OPT[S, c_i]$ in order of increasing cardinality of S . The computation of $OPT[S, c_i]$ in the case S contains only one city is trivial, because in this case, $OPT[S, c_i] = d(c_1, c_i)$. For the case $|S| > 1$, observe that if in some optimal tour in S terminating in c_i , the city c_j immediately precedes c_i , then

$$OPT[S, c_i] = OPT[S \setminus \{c_i\}, c_j] + d(c_j, c_i).$$

This leads us to expressing the value of $OPT[S, c_i]$ in terms of subsets of S as follows.

$$OPT[S, c_i] = \min \{OPT[S \setminus \{c_i\}, c_j] + \star : c_j \in S \setminus \{c_i\}\}.$$

Note that the minimum is taken over $c_j \in S \setminus \{c_i\}$. What is the missing term?

Options :

6406532051803. ✓ $d(c_j, c_i)$

6406532051804. ✗ $OPT[S \setminus \{c_j\}]$

6406532051805. ✶ $d(c_j, c_i)^2$

6406532051806. ✶ $-d(c_j, c_i)$

Maths2

Section Id :	64065341436
Section Number :	13
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	17
Number of Questions to be attempted :	17
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 :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	64065388954
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 275 Question Id : 640653614635 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : SEMESTER 2:
MATHEMATICS FOR DATA SCIENCE 2 (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 :

6406532051807. ✓ YES

6406532051808. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 64065388955

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 276 Question Id : 640653614656 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

A skier is on a mountain with equation $z = 20 - 0.4x^2 - 0.3y^2$ where z denotes the height. The skier is located at the point with xy -coordinates $(1, -1)$, and wants to ski downhill along the steepest possible path. In which direction should the skier begin skiing?

Options :

6406532051869. ✗ (0.8, 0.6)

6406532051870. ✓ (-0.8, 0.6)

6406532051871. ✗ (-0.8, -0.6)

6406532051872.

✖ (0.8, -0.6)

Sub-Section Number :	3
Sub-Section Id :	64065388956
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 277 Question Id : 640653614636 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statement(s) is/are true for an $n \times n$ matrix A ?

Options :

Let $\det(A) \neq 0$. Then determinant of A is unaltered by swapping
6406532051809. ✖ any two rows of A .

6406532051810. ✓ Determinant of A is unaltered when a multiple of a row is added to another row.

6406532051811. ✓ For any real number t , $\det(tA) = t^n \det(A)$

6406532051812. ✖ If $D = P^{-1}AP$, then $D = A$.

Question Number : 278 Question Id : 640653614637 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statement(s) is/are true for a system of linear equations $Ax = b$?

Options :

6406532051813. ✓ If x_1 and x_2 are solutions of the system, then for any $\alpha, \beta \in \mathbb{R}$, $\alpha x_1 + \beta x_2$ is also a solution if and only if $b = 0$.

6406532051814. ✗ If x_1 and x_2 are solutions of the linear equation, then $\alpha x_1 + \beta x_2$ is also a solution for any b in the column space of A .

6406532051815. ✗ The system $Ax = 0$ has a unique solution when the number of equations is less than the number of variables.

6406532051816. ✓ If the system $Ax = 0$ has a unique solution, then the columns of A are linearly independent.

Question Number : 279 Question Id : 640653614638 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Let V be the vector space of all $n \times n$ matrices with usual addition and scalar multiplication.
Which of the following set(s) form a subspace of V ?

Options :

6406532051817. ✗ $W_1 = \{A \in M_n(\mathbb{R}) : A \text{ is invertible}\}$

6406532051818. ✗ $W_2 = \{A \in M_n(\mathbb{R}) : \det(A) = 1\}$

6406532051819. ✓ $W_3 = \{A \in M_n(\mathbb{R}) : A \text{ is upper triangular}\}$

6406532051820. ✓ $W_4 = \{A \in M_n(\mathbb{R}) : A \text{ is symmetric i.e., } A^T = A\}$

Question Number : 280 Question Id : 640653614649 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Let $U = \{(x, y, z) \in \mathbb{R}^3 : x = y = z\}$ and $V = \{(x, y, z) \in \mathbb{R}^3 : x + y + z = 0\}$. Let P_U and P_V be the projections on the spaces U and V respectively. Which of the following statement(s) is/are true?

Options :

6406532051845. ❌ $\{(-1, 1, 0), (-1, -1, 2)\}$ is a basis for the range space of P_U .

6406532051846. ✓ $\{(-1, 1, 0), (-1, -1, 2)\}$ is a basis for the null space of P_U .

6406532051847. ❌ $\{(1, 1, 1)\}$ is a basis for the range space of P_V .

6406532051848. ✓ $\{(1, 1, 1)\}$ is a basis for the null space of P_V .

Question Number : 281 Question Id : 640653614651 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Let $W = \{(x, y, z) \in \mathbb{R}^3 : 2x - y - z = 3\}$. Then which of the following affine subspace(s) of \mathbb{R}^3 is/are same as the subspace W ?

Options :

6406532051853. ❌ $(6, 0, 0) + U$ where $U = \{(x, y, z) \in \mathbb{R}^3 : 2x = y + z\}$.

6406532051854. ✓ $(0, -3, 0) + U$ where $U = \{(x, y, z) \in \mathbb{R}^3 : y = 2x - z\}$.

6406532051855. ✓ $(0, 0, -3) + U$ where $U = \{(x, y, z) \in \mathbb{R}^3 : z = 2x - y\}$.

6406532051856. ❌ $(0, -3, 0) + U$ where $U = \{(x, y, z) \in \mathbb{R}^3 : 2x = y - z\}$.

Question Number : 282 Question Id : 640653614658 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Let $f(x, y) = \begin{cases} \frac{xy}{x^2+y^2} & \text{if } (x, y) \neq (0, 0), \\ 0 & \text{otherwise.} \end{cases}$. Then which of the following statement(s) is/are true?

Options :

6406532051874. ✓ The partial derivatives for f exist everywhere but directional derivatives need not exist at the origin.

6406532051875. ✗ All directional derivatives at the origin exist for the function f .

6406532051876. ✓ At $(0, 0)$, the directional derivative of f exists in the direction of x -axis.

6406532051877. ✗ The partial derivatives for f do not exist at the origin.

Sub-Section Number : 4

Sub-Section Id : 64065388957

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 283 Question Id : 640653614639 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Let $A = \begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix}$, $B = \begin{pmatrix} 0 & 1 \\ 0 & 0 \end{pmatrix}$, $C = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, $D = \begin{pmatrix} 0 & 0 \\ 1 & 0 \end{pmatrix}$, $E = \begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix}$ and $F = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$.

Then which of the following statement(s) is/are true?

Options :

6406532051821. ✗ $\text{span}\{B, C, D\} = M_2(\mathbb{R})$.

6406532051822. ✗ $\text{span}\{A, B, D\} = \text{span}\{A, F\}$

6406532051823. ✓ Span $\{A, E, F\} = \{A \in M_2(\mathbb{R}): A \text{ is symmetric i.e., } A^T = A\}$.

6406532051824. ✓ The set of all 2×2 diagonal matrices are spanned by the matrices A and E .

Question Number : 284 Question Id : 640653614646 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statement(s) about similar matrices is/are true?

Options :

Let $T: V \rightarrow W$ be a linear transformation. If A and B are two different matrices corresponding to T , then A and B must be similar.

If A and B are $n \times n$ matrices such that $\det(A) = \det(B) = 1$, then
6406532051840. ✗ A and B are similar matrices.

6406532051841. ✓ If A is similar to identity matrix, then A is a scalar matrix.

6406532051842. ✓ If A is invertible, then AB and BA are similar.

Question Number : 285 Question Id : 640653614650 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the following matrices.

$$A_1 = \begin{pmatrix} 2 & 2 \\ 0 & 2 \end{pmatrix}, A_2 = \begin{pmatrix} -1 & 2 \\ 3 & 1 \end{pmatrix}, A_3 = \begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}, \text{ and } A_4 = \begin{pmatrix} -5 & -3 \\ 6 & 5 \end{pmatrix}$$

Choose the correct option(s) from the following:

Options :

6406532051849. ✘ A_1 and A_3 are similar matrices

6406532051850. ✓ A_1 and A_3 are equivalent but not similar matrices

6406532051851. ✓ $A_4 = P^{-1}A_2P$ where $P = \begin{pmatrix} 2 & 1 \\ -1 & 0 \end{pmatrix}$

6406532051852. ✘ A_2 and A_4 are equivalent but not similar matrices

Sub-Section Number : 5

Sub-Section Id : 64065388958

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 286 Question Id : 640653614648 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Short Answer Question

Let A be an orthogonal matrix. Then the sum of squares of the elements of every row is :

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

Sub-Section Number :	6
Sub-Section Id :	64065388959
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 287 Question Id : 640653614647 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Short Answer Question

Let u, v be vectors in \mathbb{R}^3 such that $u + v$ and $u - v$ are orthogonal. If $u = (1, -2, 2)$, then $\|v\| =$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

3

Question Number : 288 Question Id : 640653614657 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Short Answer Question

Let $f(x, y, z) = x^2y^3 - 3xz$ and $u = (1, 2, 2)$. Find the directional derivative of f in the direction of the vector u at the point $(0, 1, -1)$.

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 :	64065388960
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Id : 640653614652 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Question Numbers : (289 to 291)

Question Label : Comprehension

Let L_U denote an affine subspace with the associated subspace U of \mathbb{R}^3 .

	Affine Subspace L_U		Associated subspace U		Dimension of L_U
(i)	$\{(x, y, z) \in \mathbb{R}^3 : x - y + z = -2, x + z = 1\}$	(1)	$\text{span}\{(1, 0, -1), (2, 1, 0)\}$	(a)	2
(ii)	$\{(x, y, z) \in \mathbb{R}^3 : x - 2y + z = 3\}$	(2)	$\text{span}\{(2, -1, 3)\}$	(b)	1
(iii)	$\{(x - 1, y + 1, z) \in \mathbb{R}^3 : x + 2y = 0, 3y + z = 0\}$	(3)	Nullspace of $A = \begin{pmatrix} 1 & -1 & 1 \\ 1 & 0 & 1 \end{pmatrix}$	(c)	1

Table: M2ES2

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 289 Question Id : 640653614653 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Choose the correct option to match the affine subspace of Row 1 with the associated subspaces and dimension.

Options :

6406532051857. ✓ (i) → (3) → (b)

6406532051858. ✖ (i) → (2) → (a)

6406532051859. ✖ (i) → (2) → (c)

6406532051860. ✖ (i) → (1) → (a)

Question Number : 290 Question Id : 640653614654 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Choose the correct option to match the affine subspace of Row 2 with the associated subspaces and dimension.

Options :

6406532051861. ✖ (ii) → (3) → (a)

6406532051862. ✓ (ii) → (1) → (a)

6406532051863. ✖ (ii) → (2) → (c)

6406532051864. ✖ (ii) → (1) → (b)

Question Number : 291 Question Id : 640653614655 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Choose the correct option to match the affine subspace of Row 3 with the associated subspaces and dimension.

Options :

6406532051865. ❌ (iii) → (3) → (a)

6406532051866. ✓ (iii) → (2) → (c)

6406532051867. ❌ (iii) → (2) → (a)

6406532051868. ❌ (iii) → (3) → (b)

Question Id : 640653614659 Question Type : COMPREHENSION Sub Question Shuffling

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

Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (292 to 294)

Question Label : Comprehension

Let $f(x, y) = \sin x \cos y$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 292 Question Id : 640653614660 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Choose the correct option for the parametric equations of the line tangent to f at the point $(\frac{\pi}{2}, \frac{\pi}{2})$ in the direction of x axis:

Options :

6406532051878. ❌ $x(t) = \frac{\pi}{2}, y(t) = \frac{\pi}{2} - t, z(t) = 0$

6406532051879. ✓ $x(t) = \frac{\pi}{2} + t, y(t) = \frac{\pi}{2}, z(t) = 0$

6406532051880. ❌ $x(t) = \frac{\pi}{2} + t, y(t) = \frac{\pi}{2}, z(t) = t$

Question Number : 293 Question Id : 640653614661 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Choose the correct option for the parametric equations of the line tangent to f at the point $(\frac{\pi}{2}, \frac{\pi}{2})$ in the direction of y axis:

Options :

6406532051881. ✓ $x(t) = \frac{\pi}{2}, y(t) = \frac{\pi}{2} + t, z(t) = -t$

6406532051882. ❌ $x(t) = \frac{\pi}{2} + t, y(t) = \frac{\pi}{2}, z(t) = t$

6406532051883. ❌ $x(t) = \frac{\pi}{2}, y(t) = \frac{\pi}{2} - t, z(t) = 0$

Question Number : 294 Question Id : 640653614662 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Choose the correct option for the parametric equations of the line tangent to f at the point $(\frac{\pi}{2}, \frac{\pi}{2})$ in the direction of $(-1,1)$:

Options :

6406532051884. ❌ $x(t) = \frac{\pi}{2} + \frac{t}{\sqrt{2}}, y(t) = \frac{\pi}{2} - \frac{t}{\sqrt{2}}, z(t) = -\frac{1}{\sqrt{2}}$

6406532051885. ❌ $x(t) = \frac{\pi}{2} - \frac{t}{\sqrt{2}}, y(t) = \frac{\pi}{2} + \frac{t}{\sqrt{2}}, z(t) = \frac{t}{\sqrt{2}}$

6406532051886. ✓ $x(t) = \frac{\pi}{2} - \frac{t}{\sqrt{2}}, y(t) = \frac{\pi}{2} + \frac{t}{\sqrt{2}}, z(t) = -\frac{t}{\sqrt{2}}$

Sub-Section Number : 8

Sub-Section Id : 64065388961

Question Shuffling Allowed : No

Is Section Default? : null

Question Id : 640653614640 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (295 to 299)

Question Label : Comprehension

Let $T: \mathbb{R}^3 \rightarrow \mathbb{R}^3$ and $A = \begin{pmatrix} 0 & 1 & -1 \\ 0 & 0 & 0 \\ 1 & 0 & 1 \end{pmatrix}$ be the matrix corresponding to the linear transformation T with respect to the bases $\beta = \{(1, 0, 0), (0, 1, 0), (0, 0, 1)\}$ and $\gamma = \{(1, 1, 0), (0, 1, 1), (1, 0, 1)\}$. Using the above information answer the given subquestions.

Sub questions

Question Number : 295 Question Id : 640653614641 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Choose the appropriate linear transformation T for the matrix A .

Options :

6406532051825. ❌ $T(x, y, z) = (x + y, y + z, z - x)$

6406532051826. ❌ $T(x, y, z) = (x, y - z, z + x)$

6406532051827. ✓ $T(x, y, z) = (x + y, y - z, z + x)$

6406532051828. ❌ $T(x, y, z) = (x + y, -z, z + x)$

Question Number : 296 Question Id : 640653614642 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Let B be the matrix corresponding to the linear transformation T with respect to the basis $\{(1, 0, 0), (0, 1, 0), (0, 0, 1)\}$ for both domain and codomain.

Which of the following statement(s) is/are true?

Options :

The column space of B is spanned by

6406532051829. ✓ $\{(1, 0, 1), (1, 1, 0)\}$

The nullspace of B is spanned by
6406532051830. ✘ $\{(-1,0, 0), (0,1,1)\}$

6406532051831. ✓ $rank(B) = 2$ and $nullity(B) = 1$

6406532051832. ✘ $rank(B) = 1$ and $nullity(B) = 2$

Question Number : 297 Question Id : 640653614643 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Short Answer Question

Let B be the matrix corresponding to the linear transformation T with respect to the basis $\{(1, 0, 0), (0, 1, 0), (0, 0, 1)\}$ for both domain and codomain.

The trace of B is

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

3

Question Number : 298 Question Id : 640653614644 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Short Answer Question

Let B be the matrix corresponding to the linear transformation T with respect to the basis $\{(1, 0, 0),$

$(0, 1, 0), (0, 0, 1)\}$ for both domain and codomain.

The determinant of B is

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0

Question Number : 299 Question Id : 640653614645 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statement(s) about T is/are true?

Options :

6406532051835. ❌ T is one-one but not onto

6406532051836. ✓ T is neither one-one nor onto.

Matrices corresponding to T with respect

6406532051837. ✓ to any basis has determinant zero.

There exists a basis β of \mathbb{R}^3 such that the matrix corresponding to T with respect to β

6406532051838. ❌ for both domain and codomain is invertible.

Statistics2

Section Id :	64065341437
Section Number :	14
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 :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	64065388962
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 300 Question Id : 640653614663 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : SEMESTER 2: STATISTICS FOR DATA SCIENCE 2 (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 :

6406532051887. ✓ YES

6406532051888. ✘ NO

Question Number : 301 Question Id : 640653614664 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

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) $A = \{a, a+1, \dots, b\}$	$\frac{1}{n}, \quad x = k$ $n = b - a + 1$ $k = a, a+1, \dots, b$	$\begin{cases} 0 & x < 0 \\ \frac{k-a+1}{n} & k \leq x < k+1 \\ 1 & k = a, a+1, \dots, b-1, b \\ 1 & x \geq n \end{cases}$	$\frac{a+b}{2}$	$\frac{n^2-1}{12}$
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)	${}^n C_k p^k (1-p)^{n-k}, \quad k = 0, 1, \dots, n$	$\begin{cases} 0 & x < 0 \\ \sum_{i=0}^k {}^n C_i p^i (1-p)^{n-i} & k \leq x < k+1 \\ 1 & k = 0, 1, \dots, n \\ 1 & x \geq n \end{cases}$	np	$np(1-p)$
Geometric(p)	$(1-p)^{k-1} p, \quad k = 1, \dots, \infty$	$\begin{cases} 0 & x < 0 \\ 1 - (1-p)^k & k \leq x < k+1 \\ 1 & k = 1, \dots, \infty \end{cases}$	$\frac{1}{p}$	$\frac{1-p}{p^2}$
Poisson(λ)	$\frac{e^{-\lambda} \lambda^k}{k!}, \quad k = 0, 1, \dots, \infty$	$\begin{cases} 0 & x < 0 \\ e^{-\lambda} \sum_{i=0}^k \frac{\lambda^i}{i!} & k \leq x < k+1 \\ 1 & k = 0, 1, \dots, \infty \end{cases}$	λ	λ

Continuous random variables:

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

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 $X_1, \dots, X_n \sim \text{i.i.d. } X$, parameter Θ .

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

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:

$X_1, \dots, X_n \sim \text{i.i.d. Normal}(M, \sigma^2)$.

Prior $M \sim \text{Normal}(\mu_0, \sigma_0^2)$.

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 values if required:

$$F_Z(1) = 0.84134, F_Z(-1) = 0.15866, F_Z(-1.75) = 0.04, F_Z(-0.175) = 0.43,$$

$$F_Z(-1.645) = 0.05, F_Z(-2.32) = 0.01$$

Options :

6406532051889. ✓ Useful Data has been mentioned above.

6406532051890. * This data attachment is just for a reference & not for an evaluation.

Sub-Section Number :	2
Sub-Section Id :	64065388963
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 302 Question Id : 640653614665 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Let $X_1, X_2, X_3, X_4 \sim$ i.i.d. Binomial $\left(5, \frac{1}{2}\right)$. Define another random variable $Z = \text{Max}(X_1, X_2, X_3, X_4)$. Find $4P(Z \leq 2)$. 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 :

0.23 to 0.27

Question Number : 303 Question Id : 640653614667 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Let X be a discrete random variable taking values $\{0, 1, 2\}$ with respective probabilities $\left\{\frac{p}{3}, (1-p), \frac{2p}{3}\right\}$, where $0 \leq p \leq 1$ is a parameter. Consider the samples $\{2, 1, 1, 0, 0, 2, 1, 2, 0, 2\}$ from X . Using a Uniform[0, 1] prior, find the posterior mean 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 0.70

Sub-Section Number : 3

Sub-Section Id : 64065388964

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 304 **Question Id :** 640653614666 **Question Type :** MCQ **Is Question**

Mandatory : No **Calculator :** None **Response Time :** N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 3

Question Label : Multiple Choice Question

Let $X_1, X_2, \dots, X_{100} \sim \text{Uniform}(0, \theta)$. Which of the following is an unbiased estimator for ' θ '?

Options :

6406532051892. ❌
$$\hat{\theta} = \frac{X_1 + X_3 + X_5 + \dots + X_{99}}{100}$$

6406532051893. ❌
$$\hat{\theta} = \frac{X_1 + X_2 + X_3 + \dots + X_{100}}{100}$$

6406532051894. ✓
$$\hat{\theta} = \frac{X_1 + X_2 + X_3 + \dots + X_{100}}{50}$$

6406532051895. ❌
$$\hat{\theta} = X_1 + X_2 + X_3 + \dots + X_{100}$$

Question Number : 305 Question Id : 640653614669 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following situation and match it with suitable test statistic and hypothesis test:

Suppose we observe samples from a normal distribution, where the variance is unknown. We want to check whether the mean is greater than μ . What test statistic and test can be applied for this situation?

Options :

6406532051901. ❌ Test Statistic: $T = \text{Sample mean}$, Hypothesis test: Z -test.

6406532051902. ❌ Test Statistic: $T = \text{Sample mean}$, Hypothesis test: χ^2 -test.

6406532051903. ❌ Test Statistic: $T = \text{Sample variance}$, Hypothesis test: χ^2 -test.

6406532051904. ✓ Test Statistic: $T = \text{Sample mean}$, Hypothesis test: t -test.

Sub-Section Number : 4

Sub-Section Id : 64065388965

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 306 Question Id : 640653614668 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statement(s) is (are) correct?

Options :

6406532051897. ✓ Type II error is the probability of accepting the Null hypothesis when it is not true.

6406532051898. ✗ The probability of accepting the null hypothesis when it is false is equal to the power of the test.

6406532051899. ✓ The probability of rejecting the Null hypothesis when it is true is called the level of significance.

6406532051900. ✗ If the P-value of a test is 0.04, then the corresponding test will reject the null hypothesis at the significance level of 0.03.

Sub-Section Number : 5

Sub-Section Id : 64065388966

Question Shuffling Allowed : No

Is Section Default? : null

Question Id : 640653614670 Question Type : COMPREHENSION Sub Question Shuffling

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

Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (307 to 308)

Question Label : Comprehension

An employee at a railway ticket counter serves customers in the queue individually. Suppose that the service time X_i for the i^{th} customer has mean $E[X_i] = 2$ and $\text{Var}(X_i) = 1$. Assume that service times for different customers are independent. Let Y be the total time the employee spends to serve 100 customers.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 307 Question Id : 640653614671 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following option(s) is(are) true?

Options :

6406532051905. ✘ $E[Y] = 100$

6406532051906. ✓ $E[Y] = 200$

6406532051907. ✓ $\text{Var}(Y) = 100$

6406532051908. ✘ $\text{Var}(Y) = 50$

Question Number : 308 Question Id : 640653614672 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Using the Central Limit Theorem, find an approximate value for $P(190 < Y < 210)$. 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 :

0.66 to 0.70

Question Id : 640653614673 Question Type : COMPREHENSION Sub Question Shuffling

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

Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (309 to 311)

Question Label : Comprehension

The density function of a continuous random variable X is given by

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

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 309 Question Id : 640653614674 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Short Answer Question

Find the value of k .

Enter the answer correct to one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1.5

Question Number : 310 Question Id : 640653614675 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Short Answer Question

Let $F_X(x)$ be the CDF of X .

Calculate the value of $F_X(0.5)$.

Enter the answer correct to three decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.625

Question Number : 311 Question Id : 640653614676 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Find the expected value of X.

Options :

6406532051912. ✓ $\frac{5}{12}$

6406532051913. ✗ $\frac{3}{8}$

6406532051914. ✗ $\frac{5}{8}$

6406532051915. ✗ $\frac{1}{2}$

Question Id : 640653614677 Question Type : COMPREHENSION Sub Question Shuffling

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

Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (312 to 313)

Question Label : Comprehension

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

x	0	1	2
$f_X(x)$	p	p	$1 - 2p$

Table 1

Consider 100 i.i.d. samples of X in which 0, 1, and 2 occur 30, 50, and 20 times, respectively.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 312 Question Id : 640653614678 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Short Answer Question

Find the method of moments estimate 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 :

0.34 to 0.40

Question Number : 313 Question Id : 640653614679 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Find the maximum likelihood estimate of p . Enter the answer correct to one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.4

Question Id : 640653614680 Question Type : COMPREHENSION Sub Question Shuffling

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

Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (314 to 315)

Question Label : Comprehension

The number of tosses required to get the first head on tossing a coin follows the Geometric(θ) distribution. The number of tosses observed to get the first head in 5 different i.i.d. repetitions are 2, 4, 5, 1, 3. Assume prior distribution of θ to be Beta(3, 4).

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 314 Question Id : 640653614681 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Find the posterior distribution of θ .

Options :

6406532051918. ✘ Gamma(8, 14)

6406532051919. ✘ Beta(7, 13)

6406532051920. ✓ Beta(8, 14)

Question Number : 315 Question Id : 640653614682 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Short Answer Question

Find the posterior mean. 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 :

0.33 to 0.39

Question Id : 640653614683 Question Type : COMPREHENSION Sub Question Shuffling

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

Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (316 to 317)

Question Label : Comprehension

A factory has a machine that dispenses 98.5 ml of liquid in a bottle. An employee believes that the average amount of liquid in a bottle is less than 98.5 ml. He took a sample of 100 random bottles from the factory and found out that the average amount of liquid in a bottle is 98.29 ml with a standard deviation of 1.2 ml.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 316 Question Id : 640653614684 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Define null hypothesis and alternative hypothesis.

Options :

6406532051923. ✗ $H_0 : \mu = 98.5, H_A : \mu \neq 98.5$

6406532051924. ✗ $H_0 : \mu = 98.5, H_A : \mu > 98.5$

6406532051925. ✓ $H_0 : \mu = 98.5, H_A : \mu < 98.5$

6406532051926. ✗ $H_0 : \mu \neq 98.5, H_A : \mu = 98.5$

Question Number : 317 Question Id : 640653614685 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Choose the set of correct options.

Options :

6406532051927. ✓ Reject H_0 at significance level $\alpha = 0.05$.

6406532051928. ✓ Accept H_0 at significance level $\alpha = 0.01$.

6406532051929. ✗ Accept H_0 at significance level $\alpha = 0.05$.

6406532051930. ✗ Reject H_0 at significance level $\alpha = 0.01$.

MLF

Section Id :	64065341438
Section Number :	15
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 :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	64065388967
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 318 Question Id : 640653614686 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

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 :

6406532051931. ✓ YES

6406532051932. ✗ NO

Question Number : 319 Question Id : 640653614687 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

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

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

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

6. Maximum likelihood (ML) estimation:

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

Options :

6406532051933. ✓ Useful Data has been mentioned above.

6406532051934. ❌ This data attachment is just for a reference & not for an evaluation.

Sub-Section Number : 2

Sub-Section Id : 64065388968

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 320 Question Id : 640653614688 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements accurately describes the key difference between classification and regression models?

Options :

6406532051935. ❌ In classification, the output variable is continuous and real-valued, while in regression, it is categorical.

6406532051936. ❌ Regression models are used for predicting probabilities, whereas classification models focus on predicting absolute values.

6406532051937. ✓ Classification models aim to find decision boundaries to separate data into classes, while regression models seek to predict a numeric value.

6406532051938. ✓ In regression, the commonly used loss function is mean squared error, while in classification, 0 - 1 loss is typically employed.

Question Id : 640653614689 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (321 to 322)

Question Label : Comprehension

Consider the function $f(x, y, z) = x^2 + 2y^2 - 3z^2$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 321 Question Id : 640653614690 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Short Answer Question

Find the directional derivative of f at $P_0 = (1, 1, 1)$ in the direction of

$$v = \frac{1}{\sqrt{3}}\hat{i} + \frac{1}{\sqrt{3}}\hat{j} - \frac{1}{\sqrt{3}}\hat{k}$$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0

Question Number : 322 Question Id : 640653614691 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Short Answer Question

Find the rate of change in the direction where f increases most rapidly at P_0 . 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 :

7.44 to 7.52

Sub-Section Number : 4

Sub-Section Id : 64065388970

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 323 Question Id : 640653614692 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Let $A = \begin{bmatrix} 1 & 2 & 1 & 0 & 0 \\ 1 & 2 & 2 & 2 & 3 \\ -1 & -2 & 0 & 2 & 3 \end{bmatrix}$. Find the condition on b_1, b_2, b_3 such that $Ax = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \end{bmatrix}$ has a solution.

Options :

6406532051941. ✘ $b_1 - b_2 + b_3 = 0$

6406532051942. ✘ $b_1 + b_2 + b_3 = 0$

6406532051943. ✓ $2b_1 - b_2 + b_3 = 0$

6406532051944. ✘ $2b_1 + b_2 + b_3 = 0$

Question Number : 324 Question Id : 640653614700 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

A consumer wants to maximize his utility subject to some constraints. He consumes two goods g_1 and g_2 and the utility function is the sum of g_1 and g_2 . His budget is Rs.100. The per unit price of goods g_1 and g_2 are Rs.3 and Rs.4 respectively. Choose the correct optimization problem.

Options :

6406532051968. ✓ maximize $g_1 + g_2$ subject to $3g_1 + 4g_2 \leq 100$

6406532051969. ✘ maximize g_1g_2 subject to $3g_1 + 4g_2 \leq 100$

6406532051970. ✘ maximize g_1g_2 subject to $3g_1 + 4g_2 \geq 100$

6406532051971. ✘ maximize $g_1 + g_2$ subject to $3g_1 + 4g_2 \geq 100$

Sub-Section Number : 5

Sub-Section Id : 64065388971

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 325 Question Id : 640653614693 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Let $A, B \in \mathbb{R}^{n \times n}$ be two orthogonal matrices, then which among the following statements are correct?

Options :

6406532051945. ❌ $A - I$ (where I is the identity matrix of the same size) is also orthogonal.

6406532051946. ✓ Both AB and BA are orthogonal.

6406532051947. ✓ A^n and B^n are orthogonal for every $n > 1$.

6406532051948. ❌ A and B are also symmetric matrices.

Question Number : 326 Question Id : 640653614695 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements is/are true for a real symmetric matrix A ?

Options :

6406532051953. ✓ $A^T A$ and AA^T have the same rank.

6406532051954. ✓ $A^T A$ and AA^T have the same eigenvalues

6406532051955. ❌ $A^T A$ and AA^T have the same eigenvectors.

6406532051956. ✓ $A^T A$ and AA^T have the same singular values.

Sub-Section Number : 6

Sub-Section Id : 64065388972

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 327 Question Id : 640653614694 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following matrices is/are Unitary but not Hermitian?

Options :

6406532051949. ✓ $\begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix}$

6406532051950. ✗ $\begin{bmatrix} \frac{i}{\sqrt{2}} & \frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} & -\frac{i}{\sqrt{2}} \end{bmatrix}$

6406532051951. ✗ $\begin{bmatrix} \frac{1}{\sqrt{2}} & \frac{i}{\sqrt{2}} \\ \frac{i}{\sqrt{2}} & -\frac{1}{\sqrt{2}} \end{bmatrix}$

6406532051952. ✓ $\begin{bmatrix} \frac{i}{\sqrt{2}} & \frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} & \frac{i}{\sqrt{2}} \end{bmatrix}$

Question Number : 328 Question Id : 640653614696 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which among the following is true for PCA?

Options :

6406532051957. ✓ The first principal component represents the direction along which the

variance of the dataset is maximized.

6406532051958. ✘ The first principal component represents the direction along which the variance of the dataset is minimized.

6406532051959. ✘ The first principal component is the eigenvector corresponding to the smallest eigenvalue of the covariance matrix.

6406532051960. ✓ The first principal component is the eigenvector corresponding to the largest eigenvalue of the covariance matrix.

Question Number : 329 Question Id : 640653614698 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements regarding gradient descent is/are correct?

Options :

6406532051962. ✓ If the step size is chosen as 1, we may “not always” arrive as close to the optimal solution even after many number of iterations.

6406532051963. ✓ Solution obtained for optimization problem is the local minimum of its objective function.

6406532051964. ✘ Solution obtained for optimization problem is the global minimum of its objective function.

6406532051965. ✓ Gradient descent converges to the global optimum in the case of convex functions.

6406532051966. ✘ Gradient descent does not converge to the global optimum in the case of convex functions.

Question Number : 330 Question Id : 640653614702 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Suppose a fair coin is tossed twice. Let A denote the event that the first toss is a tail. Let B denote the event that the second toss is a tail. Let C denote the event that out of the first two tosses, either both are heads or both are tails. Which among the following options are true? Select all that apply.

Options :

6406532051977. ❌ A, B and C are independent.

6406532051978. ✓ A, B and C are dependent.

6406532051979. ✓ A, B and C are pairwise independent.

6406532051980. ✓ $P(A) = P(B) = P(C) = 1/2$

Sub-Section Number : 7

Sub-Section Id : 64065388973

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 331 Question Id : 640653614697 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Short Answer Question

What will be the value of $f(x_1, x_2) = 8x_1^2 + 2x_1x_2 - x_2^2$ with an initial guess of $(0, 1)$, after two iterations of gradient descent algorithm? Take step size as 0.5.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

Sub-Section Number :	8
Sub-Section Id :	64065388974
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 332 Question Id : 640653614699 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Find the minimum distance from the surface $x^2 - y^2 - z^2 = 1$ to the origin.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 333 Question Id : 640653614704 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Let $X = \begin{pmatrix} X_1 \\ X_2 \end{pmatrix} \sim \text{Normal}(\mu, \Sigma)$, where $\mu = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$ and $\Sigma = \begin{pmatrix} 16 & a \\ a & 25 \end{pmatrix}$.

Define

$$Y_1 = 2X_1 + 2X_2 + 1$$

$$Y_2 = 3X_1 - 2X_2 - 2$$

Find the value of a for which Y_1 and Y_2 are independent.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

40

Question Number : 334 **Question Id :** 640653614705 **Question Type :** SA **Calculator :** None

Response Time : N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 3

Question Label : Short Answer Question

The average life (in years) of an electric bulb follows exponential distribution with parameter $\lambda = 0.4$. Using Weak Law of large numbers, find a lower bound on the probability that the mean life of a random sample of 50 such bulbs falls between 1.5 and 3.5 years. Enter your 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 :

0.870 to 0.880

Sub-Section Number : 9

Sub-Section Id : 64065388975

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 335 **Question Id :** 640653614701 **Question Type :** MCQ **Is Question**

Mandatory : No **Calculator :** None **Response Time :** N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 4

Question Label : Multiple Choice Question

Using Karush-Kuhn-Tucker conditions, solve the following problem.

$$\text{minimize } f(x, y) = 3x + 2y$$

$$\text{subject to } x - y + 3 \leq 0, -5x + 3y + 7 \leq 0, \text{ & } x, y \geq 0$$

The global minimum is at

Options :

6406532051972. ✘ (9, 13)

6406532051973. ✘ (0, 3)

6406532051974. ✓ (8, 11)

$$\left(\frac{7}{5}, 0\right)$$

6406532051975. ✘

6406532051976. ✘ None of these

Question Number : 336 Question Id : 640653614703 Question Type : MCQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4

Question Label : Multiple Choice Question

Let $X_1, X_2 \sim \text{i.i.d. Exponential}(2)$. Consider the transformations $Y_1 = X_1 + X_2$ and $Y_2 = X_2$.

Find the joint PDF of Y_1 and Y_2 .

Options :

$$g_{Y_1 Y_2}(y_1, y_2) = \begin{cases} 4e^{-2y_1}, & y_1 > y_2 > 0 \\ 0, & \text{otherwise} \end{cases}$$

6406532051982. ✘

$$g_{Y_1 Y_2}(y_1, y_2) = \begin{cases} 4e^{-2y_2}, & y_1 > y_2 > 0 \\ 0, & \text{otherwise} \end{cases}$$

$$6406532051983. \times g_{Y_1 Y_2}(y_1, y_2) = \begin{cases} 4e^{-4y_1}, & y_1 > y_2 > 0 \\ 0, & \text{otherwise} \end{cases}$$

$$6406532051984. \times g_{Y_1 Y_2}(y_1, y_2) = \begin{cases} 4e^{-4y_2}, & y_1 > y_2 > 0 \\ 0, & \text{otherwise} \end{cases}$$