

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 AN EXAM QDB2 13 July 2025
Subject Name :	2025 Jul13: IIT M AN EXAM QDB2
Creation Date :	2025-07-10 14:32:59
Duration :	120
Total Marks :	729
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 :	64065326488
Group Maximum Duration :	0
Group Minimum Duration :	90

Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	729
Is this Group for Examiner? :	No
Examiner permission :	Cant View
Show Progress Bar? :	No
Revisit allowed for group Instructions? :	Yes
Maximum Instruction Time :	0
Minimum Instruction Time :	0
Group Time In :	Minutes
Revisit Section :	Yes
Action on Revisit Section :	View and Edit
Navigate To Group Summary From Last Question? :	No
Disable Submit Button During Assessment? :	No
Section Selection Time? :	0
No of Optional sections to be attempted :	0

Algorithmic Thinking in Bio

Section Id :	64065391694
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	10
Section Marks :	50
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653201879
Question Shuffling Allowed :	No

Question Number : 1 Question Id : 6406531279324 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : ALGORITHMIC THINKING IN BIOINFORMATICS (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 :

6406534313421. ✓ YES

6406534313422. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 640653201880

Question Shuffling Allowed : Yes

Question Number : 2 Question Id : 6406531279325 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

Consider the cell signaling network (weighted, undirected graph) given in Figure 1.

The values represent the edge weights. Assume the weights of non-existent edges to be $-\infty$.

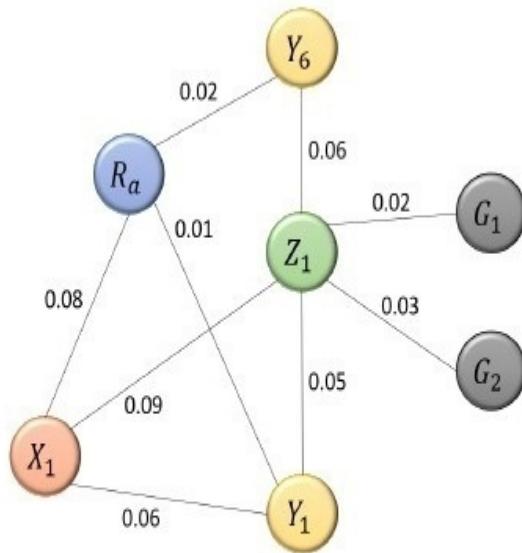


Figure 1: Gene Regulatory Network

Let $W[v, X]$ represent the DP table for the color-coding algorithm to compute a k -length path (connecting the receptors to regulators) with maximum weight. Assume the receptor R_a forms the set of source nodes. Calculate $W[Z_1, \{blue, yellow, green\}]$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.07 to 0.09

Sub-Section Number : 3

Sub-Section Id : 640653201881

Question Shuffling Allowed : Yes

Question Number : 3 Question Id : 6406531279326 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

Assume we are using a logistic regression model to estimate the probability of a protein pair (u, v) to truly interact based on two features X_{uv}^1 and X_{uv}^2 . Let β_0 be the intercept and β_1 and β_2 be the weights of the features X_{uv}^1 and X_{uv}^2 respectively. In the trained model, $\hat{\beta}_1 = 1.1$ and $\hat{\beta}_2 = 0.4$. For a protein pair with $X_{uv}^1 = 0.6$ and $X_{uv}^2 = 3$, this trained model predicted the probability of interaction to be 0.7427. What will this model predict for the probability of interaction of another protein pair with $X_{uv}^1 = 1$ and $X_{uv}^2 = -1$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.425 to 0.525

Sub-Section Number :

4

Sub-Section Id :

640653201882

Question Shuffling Allowed :

Yes

Question Number : 4 Question Id : 6406531279327 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Recall that the odds of an event, which occurs with probability P , is given by: Odds := $\frac{P}{1-P}$. In a logistic regression model for predicting whether two proteins interact, one of the input features has a coefficient of 0.7. Suppose we increase this feature by 1 unit. Then the odds of these two proteins interacting _____

Options :

6406534313425. ✗ reduces by about 50.

6406534313426. ✓ increases by about 2.

6406534313427. ✗ increases by about 0.7.

6406534313428. ✗ does not change.

Sub-Section Number :

5

Sub-Section Id :

640653201883

Question Shuffling Allowed :

Yes

Question Number : 5 Question Id : 6406531279328 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Let A be a multiset of k -mers and G_A be the de Bruijn graph constructed from A . One of the k -mers $x \in A$ is replaced by another different k -mer x' to obtain A' , i.e., $A' = A \setminus \{x\} \cup \{x'\}$ and let the corresponding de Bruijn graph on A' be $G_{A'}$. If the node set of G_A and $G_{A'}$ remain the same, then the number of nodes with different degrees in the two graphs can be _____.

Options :

6406534313429. ✘ 0

6406534313430. ✘ 1

6406534313431. ✘ 2

6406534313432. ✓ 3

6406534313433. ✓ 4

Sub-Section Number :

6

Sub-Section Id :

640653201884

Question Shuffling Allowed :

Yes

Question Number : 6 Question Id : 6406531279329 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

You are given a multiset of k -mers A based on a sequencing experiment and you want to reconstruct a genome sequence S whose k -mer composition is consistent with A . Let G_O and G_d respectively denote the overlap and de Bruijn graph constructed using A . Which of the following statements is/are true?

Options :

6406534313434. ✓ If a Hamiltonian path corresponding to S exists in G_O , then an Eulerian path corresponding to S exists in G_d .

6406534313435. ✓ If an Eulerian path corresponding to S exists in G_d , then a Hamiltonian path corresponding to S exists in G_O .

6406534313436. ✓ If a Hamiltonian path corresponding to S does not exist in G_O , then an Eulerian path corresponding to S does not exist in G_d .

6406534313437. ✓ If an Eulerian path corresponding to S does not exist in G_d , then a Hamiltonian path corresponding to S does not exist in G_O .

Sub-Section Number :

7

Sub-Section Id :

640653201885

Question Shuffling Allowed :

No

Question Id : 6406531279330 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (7 to 9)

Question Label : Comprehension

You fly to an alien world and are surprised to find life that follows the same central dogma principle. The difference is that the alien life has 5 different nucleotides. Answer the given subquestions with respect to the same.

Sub questions

Question Number : 7 Question Id : 6406531279331 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Suppose a gene g (of length k) does not have any exons. How many different types of protein can be produced from g ?

Options :

6406534313438. ✓ 0

6406534313439. ✗ 1

6406534313440. ✗ 5^k

6406534313441. ✗ 4^k

6406534313442. ✗ None of these

Question Number : 8 Question Id : 6406531279332 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Suppose this alien life has 600 distinct amino acids that make up protein sequences. What is your best guess on the length of each codon in this alien species?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

4

Question Number : 9 Question Id : 6406531279333 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Suppose this planet cannot block out harmful radiation from space, making this alien life prone to acquiring a very high number of DNA mutations. Then, what is your best guess for the minimum length of each codon?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

5

Sub-Section Number :	8
Sub-Section Id :	640653201886
Question Shuffling Allowed :	No

Question Id : 6406531279334 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (10 to 11)

Question Label : Comprehension

Consider the following k -mers found from the genome sequence of some organism.

ATG,CAT, TAG,GAT,TTA,AAT, ATA, AGA, ATC, TGC,GCA

Answer the given subquestions with respect to the corresponding overlap graph.

Sub questions

Question Number : 10 Question Id : 6406531279335 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

How many nodes are there in the graph?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

11

Question Number : 11 Question Id : 6406531279336 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

How many edges are there in the graph?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

16

Question Id : 6406531279337 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (12 to 13)

Question Label : Comprehension

Consider the alignment graph based DP table below to find the best global alignment between two strings (represented along the rows and the columns). The DP table has $(n + 1) \times (m + 1)$ entries i.e., $DP[0, 0]$ to $DP[n, m]$, where n is length of first string and m is length of second string. $DP[i, j]$ is the score of best global alignment between the length- i prefix of the first string and length- j prefix of the second string.

Fill the DP table given below and answer the given subquestions accordingly. Scoring is done as follows:

	G	T	A	C	A
G					
A					
C					
A					
T					

- For each match between two symbols: +1 point
- For each mismatch between two symbols: 0 point
- For each removal of symbol from any one sequence: 0 point

Sub questions

Question Number : 12 Question Id : 6406531279338 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

How many entries in the grid consists of the number 2?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

7

Question Number : 13 Question Id : 6406531279339 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

In the global alignment, what happens to the last character of the first string? Assume the first string (top string in the alignment) is along the rows i.e., GACAT.

Options :

6406534313448. ❌ The last character is matched to the corresponding character in the second string.

6406534313449. ❌ The last character is involved in a mismatch operation.

6406534313450. ❌ The last character is inserted.

6406534313451. ✓ The last character is deleted.

Question Id : 6406531279340 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (14 to 16)

Question Label : Comprehension

Given below in Figure 2 is the BLOSUM50 scoring matrix for amino acids. Use the same as the scoring matrix and answer the given subquestions.

	A	C	D	E	F	G	H	I	K	L	M	N	P	Q	R	S	T	V	W	Y
A	5	-1	-2	-1	-3	0	-2	-1	-1	-2	-1	-1	-1	-1	-2	1	0	0	-3	-2
C	-1	13	-4	-3	-2	-3	-3	-2	-3	-2	-2	-2	-4	-3	-4	-1	-1	-1	-5	-3
D	-2	-4	8	2	-5	-1	-1	-4	-1	-4	-4	2	-1	0	-2	0	-1	-4	-5	-3
E	-1	-3	2	6	-3	-3	0	-4	1	-3	-2	0	-1	2	0	-1	-1	-3	-3	-2
F	-3	-2	-5	-3	8	-4	-1	0	-4	1	0	-4	-4	-4	-3	-3	-2	-1	1	4
G	0	-3	-1	-3	-4	8	-2	-4	-2	-4	-3	0	-2	-2	-3	0	-2	-4	-3	-3
H	-2	-3	-1	0	-1	-2	10	-4	0	-3	-1	1	-2	1	0	-1	-2	-4	-3	2
I	-1	-2	-4	-4	0	-4	-4	5	-3	2	2	-3	-3	-3	-4	-3	-1	4	-3	-1
K	-1	-3	-1	1	-4	-2	0	-3	6	-3	-2	0	-1	2	3	0	-1	-3	-3	-2
L	-2	-2	-4	-3	1	-4	-3	2	-3	5	3	-4	-4	-2	-3	-3	-1	1	-2	-1
M	-1	-2	-4	-2	0	-3	-1	2	-2	3	7	-2	-3	0	-2	-2	-1	1	-1	0
N	-1	-2	2	0	-4	0	1	-3	0	-4	-2	7	-2	0	-1	1	0	-3	-4	-2
P	-1	-4	-1	-1	-4	-2	-2	-3	-1	-4	-3	-2	10	-1	-3	-1	-1	-3	-4	-3
Q	-1	-3	0	2	-4	-2	1	-3	2	-2	0	0	-1	7	1	0	-1	-3	-1	-1
R	-2	-4	-2	0	-3	-3	0	-4	3	-3	-2	-1	-3	1	7	-1	-1	-3	-3	-1
S	1	-1	0	-1	-3	0	-1	-3	0	-3	-2	1	-1	0	-1	5	2	-2	-4	-2
T	0	-1	-1	-1	-2	-2	-2	-1	-1	-1	-1	0	-1	-1	-1	2	5	0	-3	-2
V	0	-1	-4	-3	-1	-4	-4	4	-3	1	1	-3	-3	-3	-3	-2	0	5	-3	-1
W	-3	-5	-5	-3	1	-3	-3	-3	-2	-1	-4	-4	-1	-3	-4	-3	-3	15	2	
Y	-2	-3	-3	-2	4	-3	2	-1	-2	-1	0	-2	-3	-1	-1	-2	-2	-1	2	8

Figure 2: BLOSUM50 scoring matrix for amino acids

Sub questions

Question Number : 14 Question Id : 6406531279341 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Global alignment among which of the following pairs of the peptides results in the maximum alignment score? Here X^n represents the string with the amino acid X repeated n times.

Options :

6406534313452. ✗ W⁵⁰ and W⁵⁰

6406534313453. ✓ RW²⁵RW²⁵ and RW²⁵RW²⁵

6406534313454. ✗ RW⁴⁸R and RW⁴⁸R

6406534313455. ✗ R⁵⁰ and R⁵⁰

Question Number : 15 Question Id : 6406531279342 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

The peptide STW is aligned with the peptide generated from the RNA string AGUAUGCCUCAAACUUGG. If gap opening penalty is -20 and gap extension penalty is -2, then use the genetic code given below in Figure 3 to compute the optimal global alignment score between the peptides.

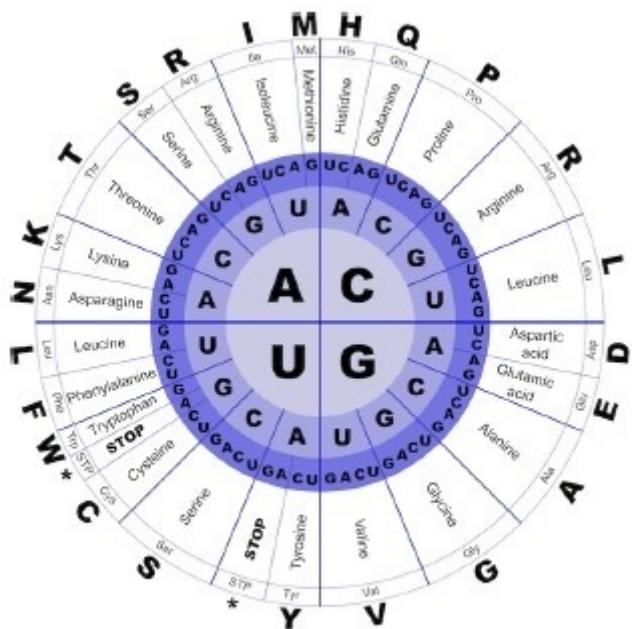


Figure 3: The Genetic Code

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 16 Question Id : 6406531279343 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Calculate the local alignment score between the same two peptides as in the previous question.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

Sw Testing

Section Id :	64065391695
Section Number :	2
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	16
Number of Questions to be attempted :	16
Section Marks :	100
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653201887
Question Shuffling Allowed :	No

Question Number : 17 Question Id : 6406531279344 Question Type : MCQ

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 :

6406534313458. ✓ YES

6406534313459. ✗ NO

Sub-Section Number :	2
Sub-Section Id :	640653201888
Question Shuffling Allowed :	Yes

Question Number : 18 Question Id : 6406531279345 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

The following table lists some concepts from Software Testing.

Column A	Column B
i) Cyclomatic complexity	a) Maximal chain
ii) Edge coverage	b) Def-clear paths
iii) Data flow testing	c) Branch coverage
iv) Decision-to-Decision (DD) paths	d) Linearly independent paths

Match each term given in Column A with the related term given in Column B.

Options :

6406534313460. ❌ i - a, ii - b, iii - c, iv - d

6406534313461. ✓ i - d, ii - c, iii - b, iv - a

6406534313462. ❌ i - b, ii - c, iii - a, iv - d

6406534313463. ❌ i - d, ii - b, iii - c, iv - a

Question Number : 19 Question Id : 6406531279349 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

A mobile app sends a request over the network to the server, to retrieve results of students in a particular subject, upon receiving the request, the server responds back with the results data for that subject. In this scenario, which type of interface exists between the mobile app and the server?

Options :

6406534313476. ❌ Shared memory interface

6406534313477. ✓ Message-passing interface

6406534313478. ❌ Procedure call interface

6406534313479. ❌ External file interface

Question Number : 20 Question Id : 6406531279352 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

In an organization, software developers and testers are cooperating with each other in order to reduce risks in using the software product.

Considering this scenario, identify the minimum process maturity level of this organization.

Options :

6406534313488. ✘ Level 1

6406534313489. ✘ Level 2

6406534313490. ✓ Level 3

6406534313491. ✘ Level 4

Question Number : 21 Question Id : 6406531279353 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

A software testing engineer performed various tests on a web application to ensure that users can easily access and use the application user interface on different types of devices such as smartphones, tablets, and desktop computers, all of which have different form factors and screen sizes. Which of the following types of testing does this scenario represent?

Options :

6406534313492. ✘ Stress Testing

6406534313493. ✓ Usability Testing

6406534313494. ✘ Functional Testing

6406534313495. ✘ Performance Testing

Question Number : 22 Question Id : 6406531279355 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

Fill in the blank with the appropriate option.

_____ deals with testing each linearly independent path in the CFG of the program.

Options :

6406534313500. ✘ Complexity testing

6406534313501. ✓ Basis path testing

6406534313502. ✘ Unit testing

6406534313503. ✘ Integration testing

Sub-Section Number :

3

Sub-Section Id :

640653201889

Question Shuffling Allowed :

Yes

Question Number : 23 Question Id : 6406531279346 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the following statements and choose the appropriate option.

- i) A module or a component is a self-contained element of a system.
- ii) Interfaces implement a mechanism for passing control and data between modules.

Options :

6406534313464. ✘ Statement i) is correct and Statement ii) is incorrect.

6406534313465. ✘ Statement ii) is correct and Statement i) is incorrect.

6406534313466. ✘ Both statements are incorrect.

6406534313467. ✓ Both statements are correct.

Question Number : 24 Question Id : 6406531279347 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the following statements and choose the appropriate option.

- i) Each du-path is a simple path, so prime path coverage subsumes all-du-paths coverage.
- ii) All-du-paths coverage does not subsume edge coverage.

Options :

6406534313468. ✓ Statement i) is correct and Statement ii) is incorrect.

6406534313469. ✘ Statement ii) is correct and Statement i) is incorrect.

6406534313470. ✘ Both statements are incorrect.

6406534313471. ✘ Both statements are correct.

Question Number : 25 Question Id : 6406531279348 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Fill in the blank with the appropriate option.

_____ is a software component or test tool that replaces a component that takes care of the control and/or the calling of a software component.

Options :

6406534313472. ✓ Test driver

6406534313473. ✘ Test suite

6406534313474. ✘ Test method

6406534313475. ✘ Test stub

Question Number : 26 Question Id : 6406531279351 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Fill in the blank with the appropriate option.

A path from node n_i to n_j is a _____ if no node appears more than once, except possibly the first and last node.

Options :

6406534313484. ✓ simple path

6406534313485. ✗ test path

6406534313486. ✗ DD-path

6406534313487. ✗ def-clear path

Question Number : 27 Question Id : 6406531279356 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Fill in the blank with the appropriate option.

A DD-path consists of a maximal chain of length _____.

Options :

6406534313504. ✗ equal to 1

6406534313505. ✗ equal to 2

6406534313506. ✓ greater than or equal to 1

6406534313507. ✗ at most 3

Sub-Section Number :

4

Sub-Section Id :

640653201890

Question Shuffling Allowed :

Yes

Question Number : 28 Question Id : 6406531279350 Question Type : MCQ

Correct Marks : 6

Question Label : Multiple Choice Question

Consider the following statements regarding the approaches in integration testing:

- i) In big bang approach, the entire system is tested as a whole.
- ii) Sandwich approach uses a mix of top-down and bottom-up testing approaches.
- iii) Top-down approach does not work well for systems with hierarchical design.

Choose the correct option.

Options :

6406534313480. ❌ Statement i) and iii) are correct. Statement ii) is incorrect.

6406534313481. ❌ Statement i) is correct. Statement ii) and iii) are incorrect.

6406534313482. ❌ Statement ii) and iii) are correct. Statement i) is incorrect.

6406534313483. ✓ Statement i) and ii) are correct. Statement iii) is incorrect.

Question Number : 29 Question Id : 6406531279354 Question Type : MCQ

Correct Marks : 6

Question Label : Multiple Choice Question

Complete path coverage on a CFG becomes infeasible due to which of the following reasons?

Options :

6406534313496. ❌ Due to presence of multiple branches

6406534313497. ❌ Due to presence of multiple terminal nodes

6406534313498. ✓ Due to presence of loops

6406534313499. ❌ Complete path coverage is always feasible

Sub-Section Number :

5

Sub-Section Id :

640653201891

Question Shuffling Allowed :

Yes

Question Number : 30 Question Id : 6406531279357 Question Type : MSQ

Correct Marks : 6 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the following code. The method `containsPrime(int[] numbers)` needs to be tested. There are some faults in the code base.

```
public static class Primes {  
    // Inputs: An array of integers.  
    // Effects: Returns true if any integer in the array is prime, else false.  
    // Assumptions: Throws NullPointerException if the array is null.  
    public static boolean containsPrime(int[] numbers) {  
        for (int i = numbers.length - 1; i > 0; i--) {  
            boolean isPrime = true;  
            for (int k = 2; k < numbers[i]; k++) {  
                if (numbers[i] % k == 0) {  
                    isPrime = false;  
                    break;  
                }  
            }  
            if (isPrime) {  
                return true;  
            }  
        }  
        return false;  
    }  
}  
  
// Test Class  
import static org.junit.Assert.*;  
import org.junit.Test;  
// Test Cases  
public class TestPrimes {  
    @Test  
    public void testCase1() {  
        int[] numbers = { 91, 25, 32, 96, 3 };  
        assertTrue(Primes.containsPrime(numbers));  
    }  
    @Test  
    public void testCase2() {  
        int[] numbers = { 23, 81, 68, 30, 55 };  
        assertTrue(Primes.containsPrime(numbers));  
    }  
    @Test  
    public void testCase3() {  
        int[] numbers = { 15, 16, 18, 20, 21, 22 };  
        assertFalse(Primes.containsPrime(numbers));  
    }  
    @Test  
    public void testCase4() {  
        int[] numbers = { -27, 34, 36, 38, -40 };  
        assertFalse(Primes.containsPrime(numbers));  
    }  
}
```

Based on the given unit tests, identify which test cases would be able to uncover the faults.

Options :

6406534313508. ✘ testcase1()

6406534313509. ✓ testcase2()

6406534313510. ✘ testcase3()

6406534313511. ✓ testcase4()

Sub-Section Number :

6

Sub-Section Id :

640653201892

Question Shuffling Allowed :

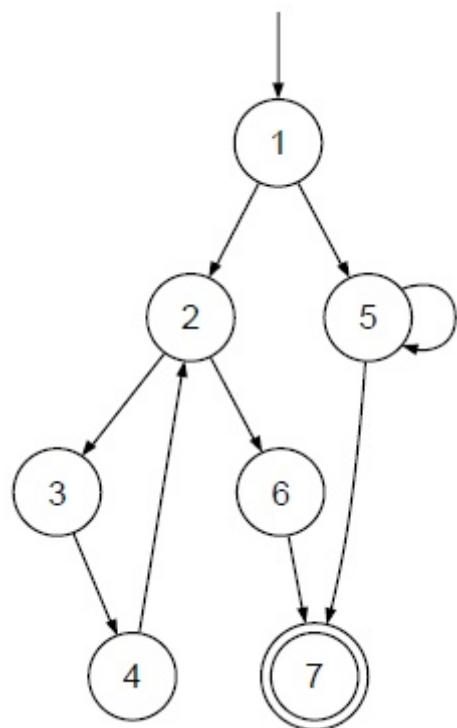
No

Question Id : 6406531279358 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (31 to 33)

Question Label : Comprehension

Consider the CFG given below, and answer the subquestions.



Sub questions

Question Number : 31 Question Id : 6406531279359 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

How many test requirements are there for edge-pair coverage?

Options :

6406534313512. ✘ 12

6406534313513. ✘ 11

6406534313514. ✘ 9

6406534313515. ✓ 10

Question Number : 32 Question Id : 6406531279360 Question Type : MCQ

Correct Marks : 6

Question Label : Multiple Choice Question

How many test requirements are there for prime path coverage?

Options :

6406534313516. ✓ 8

6406534313517. ✘ 6

6406534313518. ✘ 3

6406534313519. ✘ 10

Question Number : 33 Question Id : 6406531279361 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

What is the cyclomatic complexity of the given CFG?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

4

Sub-Section Number : 7

Sub-Section Id : 640653201893

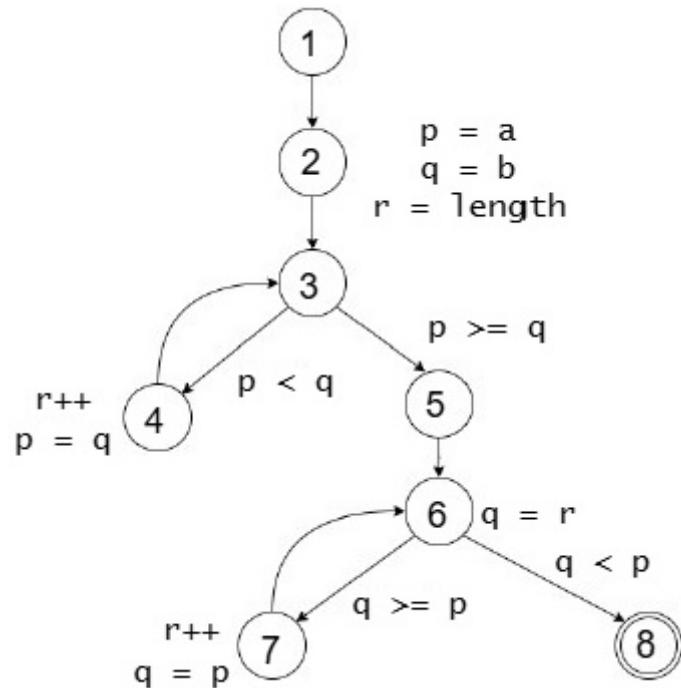
Question Shuffling Allowed : No

Question Id : 6406531279362 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (34 to 37)

Question Label : Comprehension

Consider the following data flow graph and answer the given subquestions.



Sub questions

Question Number : 34 Question Id : 6406531279363 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

How many definitions are there for the variable **p**?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

2

Question Number : 35 Question Id : 6406531279364 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

How many uses are there for the variable **p**?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

5

Question Number : 36 Question Id : 6406531279365 Question Type : SA

Correct Marks : 6

Question Label : Short Answer Question

How many du-pairs are there for the variable p?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

11

Question Number : 37 Question Id : 6406531279366 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

Which of the following is not a def-clear path for variable p?

Options :

6406534313524. ✗ [2, 3, 5]

6406534313525. ✗ [2, 3, 4]

6406534313526. ✓ [2, 3, 4, 3, 5]

6406534313527. ✗ [6, 7, 6, 8]

AI

Section Id :	64065391696
Section Number :	3
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	7
Number of Questions to be attempted :	7
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 :	No
Section Maximum Duration :	0

Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653201894
Question Shuffling Allowed :	No

Question Number : 38 Question Id : 6406531279367 Question Type : MCQ

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 :

6406534313528. ✓ YES

6406534313529. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 640653201895

Question Shuffling Allowed : No

Question Id : 6406531279368 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (39 to 50)

Question Label : Comprehension

STATE SPACE SEARCH

Background:

Inspired by Pallanguzhi, a two-person game played in Tamil Nadu, Kerala, Sri Lanka and Malaysia.

There are three cups A, B, C, where each cup holds zero or more shells (or seeds).

A state is represented by a three digit number "abc" where the digits a, b and c indicate the number of shells in cups A, B and C, respectively.

A single move (for a player) has three steps: select a **non-empty** cup, remove all shells from that cup and distribute those shells in a round-robin manner. **Complete all three steps to complete a single move.**

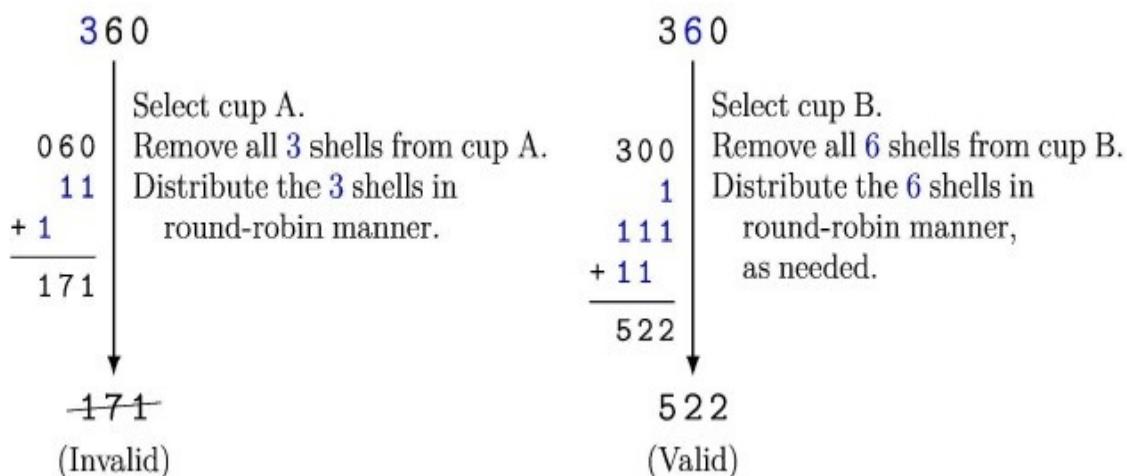
For example, select cup A, remove all shells from cup A (say N shells) then add one shell to each cup in the round-robin sequence B, C, A, B, C, A, ..., until all N shells are placed.

If you select cup B, follow the round-robin sequence C, A, B, C, A, B, ...

If you select cup C, follow the round-robin sequence A, B, C, A, B, C, ...

Valid move: a move ("abc" ---> "xyz") is valid if the first digit 'x' (in output state) is greater than or equal to the first digit 'a' in input state.

MoveGen example: the state 360 allows only two moves: select cup A to generate 171, or select cup B to generate 522. Of the two moves, only 522 is valid, therefore, MoveGen(360) = [522].



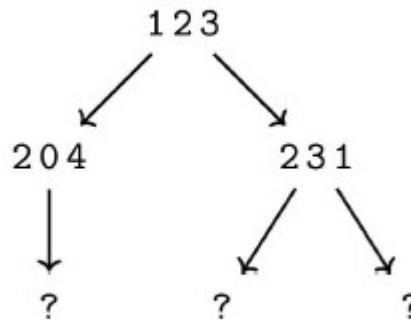
Problem statement:

Begin with the state "123" and construct the state space by generating valid moves.

For each state "abc", the heuristic $h(abc) = a + b$, returns the number of shells in the first two cups as the heuristic value. Use this heuristic when required.

x	$h(x)$	MoveGen(x)
123	3	[204, 231]
204	2	[411]
231	5	[312, 330]
411
312
330
...
...

(Graph-123)



Complete the table shown above and complete the state space graph (call it Graph-123) and then answer the subquestions.

IMPORTANT: your MoveGen function must consider only valid moves and it must return the neighbours in ascending order.

Sub questions

Question Number : 39 Question Id : 6406531279369 Question Type : MSQ

Correct Marks : 1 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following will be present in MoveGen(411)?

Options :

6406534313530. ❌ 132

6406534313531. ❌ 222

6406534313532. ✓ 402

6406534313533. ✓ 510

Question Number : 40 Question Id : 6406531279370 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

$h(411)$ is equal to _____ .

Enter an integer.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

Answer Format: 7

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

5

Question Number : 41 Question Id : 6406531279371 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

For the state space Graph-123, the lowest value of h is _____.

Enter an integer.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

Answer Format: 7

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

2

Question Number : 42 Question Id : 6406531279372 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

For the state space Graph-123, the highest value of h is _____.

Enter an integer.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

Answer Format: 7

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

6

Question Number : 43 Question Id : 6406531279373 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

For the state space Graph-123, the heuristic function h defines a _____.

Options :

6406534313537. ✓ maximization problem

6406534313538. ✗ minimization problem

Question Number : 44 Question Id : 6406531279374 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Select the statements that are true in the state space Graph-123.

Options :

6406534313539. ✗ Every state is connected to every other state.

6406534313540. ✗ Every move is reversible.

6406534313541. ✓ The number of shells in each state is the same (constant).

6406534313542. ✗ None of these.

Question Number : 45 Question Id : 6406531279375 Question Type : MSQ

Correct Marks : 1 Max. Selectable Options : 0

Question Label : Multiple Select Question

In the state space Graph-123, _____ .

Options :

6406534313543. ✗ every state has exactly one incoming edge

6406534313544. ✗ every state has exactly one outgoing edge

6406534313545. ✓ there is at least one state which has no incoming edges

6406534313546. ✓ there is at least one state which has no outgoing edges

Question Number : 46 Question Id : 6406531279376 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

The number of unique states in the state space Graph-123 is _____ .

Enter an integer.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

Answer Format: 17

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

12

Question Number : 47 Question Id : 6406531279377 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Use Depth-First Search to find a path from "123" to "600" where the MoveGen function returns neighbours in ascending order. At the point when GoalTest returns true, the goal state will be present in the OPEN list, what other states will be present in the OPEN list at that point?

Enter the states in ascending order as a comma separated list.

Enter NIL if no other states are present in OPEN.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

Answer Format: 123,204

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

231

Question Number : 48 Question Id : 6406531279378 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Use Breadth-First Search to find a path from "123" to "600" where the MoveGen function returns neighbours in ascending order. At the point when GoalTest returns true, the goal state will be present in the OPEN list, what other states will be present in the OPEN list at that point?

Enter the states in ascending order as a comma separated list.

Enter NIL if no other states are present in OPEN.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

Answer Format: 123,204

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

Question Number : 49 Question Id : 6406531279379 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Use Best-First Search to find a path from "123" to "600" where the MoveGen function returns neighbours in ascending order. List the heuristic values of the nodes in the path (from "123" to "600") discovered by Best-First Search.

Enter the heuristic values as a comma separated list. Enter NIL if no path is found.
NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

Answer Format: 2,4,2

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

3,5,6,5,6,5,6

Question Number : 50 Question Id : 6406531279380 Question Type : MSQ

Correct Marks : 1 Max. Selectable Options : 0

Question Label : Multiple Select Question

For the state space Graph-123, which of the following algorithms will find the shortest path from "123" to "600" when the MoveGen function returns neighbours in ascending order?

Options :

6406534313551. ❌ Best-First Search

6406534313552. ✓ Breadth-First Search

6406534313553. ✓ Depth-First Search

6406534313554. ❌ Hill Climbing

Sub-Section Number : 3

Sub-Section Id : 640653201896

Question Shuffling Allowed : No

Question Number : 51 Question Id : 6406531279381 Question Type : MSQ

Correct Marks : 1 Max. Selectable Options : 0

Question Label : Multiple Select Question

Genetic Algorithm

Which of the following are constructive methods?

Options :

6406534313555. ❌ Search algorithm that uses 2-city exchange.

6406534313556. ❌ Genetic algorithm that uses single-point crossover.

6406534313557. ✓ Greedy Heuristic.

6406534313558. ✓ Nearest Neighbour Heuristic.

6406534313559. ✓ Savings Heuristic.

Sub-Section Number : 4

Sub-Section Id : 640653201897

Question Shuffling Allowed : No

Question Number : 52 Question Id : 6406531279382 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Genetic Algorithm

Tour representations are basically raw lists (list of city names or list of city positions) which are interpreted differently by each representation. Given a symmetric TSP, for which of the following representations the raw list reversal will produce a new tour?

Options :

6406534313560. ✘ Path representation

6406534313561. ✘ Adjacency representation

6406534313562. ✘ Ordinal representation

6406534313563. ✓ None of these

Sub-Section Number :

5

Sub-Section Id :

640653201898

Question Shuffling Allowed :

No

Question Number : 53 Question Id : 6406531279383 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Genetic Algorithm

Compute the ordinal representation of tour P1 (given in path representation). Use A,B,C,D,E,F as the index sequence.

P1: E,F,A,C,D,B

Enter the ORDINAL representation as a comma separated list.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

Answer Format: 1,3,5,9,6,4

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

5,5,1,2,2,1

Question Number : 54 Question Id : 6406531279384 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Genetic Algorithm

Path representation of two parent tours are given below. Express the parent tours in ordinal representation (use A,B,C,D,E,F as the index sequence) and generate offspring using midpoint crossover. Enter the ordinal representation of one of the child tours.

P1: E,F,A,C,D,B

P2: C,A,D,B,E,F

Enter the ordinal representation as a comma separated list.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

Answer Format: 1,3,5,9,6,4

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Set

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

3,1,2,2,2,1

5,5,1,1,1,1

Sub-Section Number : 6

Sub-Section Id : 640653201899

Question Shuffling Allowed : No

Question Id : 6406531279385 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (55 to 60)

Question Label : Comprehension

TSP

The distance matrix for 5 cities and the corresponding edge costs (in sorted order) are provided below. Use this information to construct TSP tours.

	A	B	C	D	E
A	-	42	45	80	64
B	42	-	10	23	21
C	45	10	-	35	24
D	80	23	35	-	86
E	64	21	24	86	-

BC	10
BE	21
BD	23
CE	24
CD	35

AB	42
AC	45
AE	64
AD	80
DE	86

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 55 Question Id : 6406531279386 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Use D as the starting city, construct a tour using Nearest Neighbour Heuristic. The tour is _____ . Enter the path representation of the tour starting from D and in the order the cities are visited by the Nearest Neighbour Heuristic.

Enter a comma separated list of city names.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

Answer format: D,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,B,C,E,A

Question Number : 56 Question Id : 6406531279387 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

What is the cost of the tour generated by Nearest Neighbour Heuristic?

Enter a number.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

Answer format: 17

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

201

Question Number : 57 Question Id : 6406531279388 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Construct a tour using Greedy Heuristic. Enter the path representation of the tour starting from city D.

Enter a comma separated list of city names.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

Answer format: D,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 :

D,C,B,E,A

D,A,E,B,C

Question Number : 58 Question Id : 6406531279389 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

What is the cost of the tour generated by Greedy Heuristic?

Enter a number.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

Answer format: 17

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

210

Question Number : 59 Question Id : 6406531279390 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Construct the savings tour using D as the base city. The savings for the pairs AB, AC, BC and BE, respectively, are 61, 70, 48 and 88. Compute the savings for the remaining pairs of cities and then compute the savings tour. Enter the path representation of the savings tour starting from city D.

Enter a comma separated list of city names.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

Answer format: D,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 :

D,B,A,E,C

D,C,E,A,B

Question Number : 60 Question Id : 6406531279391 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

For the given TSP, which of the following algorithms produce a better tour?

Options :

6406534313571. ✘ Greedy Heuristic

6406534313572. ✘ Nearest Neighbour Heuristic

6406534313573. ✓ Savings Heuristic

Deep Learning

Section Id :

64065391697

Section Number :

4

Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	10
Section Marks :	50
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653201900
Question Shuffling Allowed :	No

Question Number : 61 Question Id : 6406531279392 Question Type : MCQ

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 :

6406534313574. ✓ YES

6406534313575. ✗ NO

Sub-Section Number :	2
Sub-Section Id :	640653201901
Question Shuffling Allowed :	Yes

Question Number : 62 Question Id : 6406531279393 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider a neural network for a regression problem with three hidden layers, each having 10 neurons. The output layer has one neuron. The input $\in \mathbb{R}^{10}$ and the output $\in \mathbb{R}$. The network is represented by a function $f : \mathbb{R}^{10} \rightarrow \mathbb{R}$. Ignore the biases. If the activation function for all neurons is linear, is the following statement true or false?

The network is just computing a linear function of the input and can be represented as $f(x) = w^T x$, for some $w \in \mathbb{R}^{10}$.

Options :

6406534313576. ✓ True

6406534313577. ✗ False

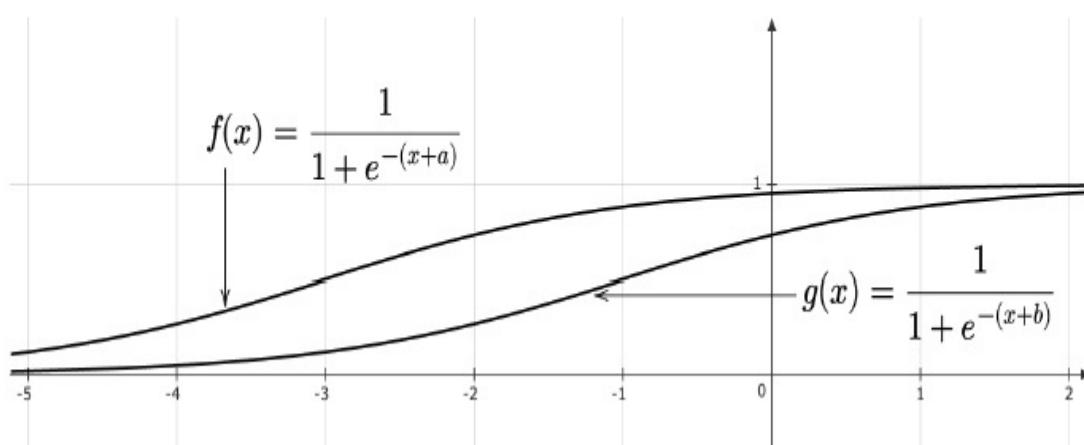
6406534313578. ✗ Insufficient data to arrive at a conclusion

Question Number : 63 Question Id : 6406531279394 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider two sigmoid functions:



Which of the following is true?

Options :

6406534313579. ✓ $a > b$

6406534313580. ✗ $a < b$

6406534313581. ✗ $a = b$

Sub-Section Number :

3

Sub-Section Id :

640653201902

Question Shuffling Allowed :

Yes

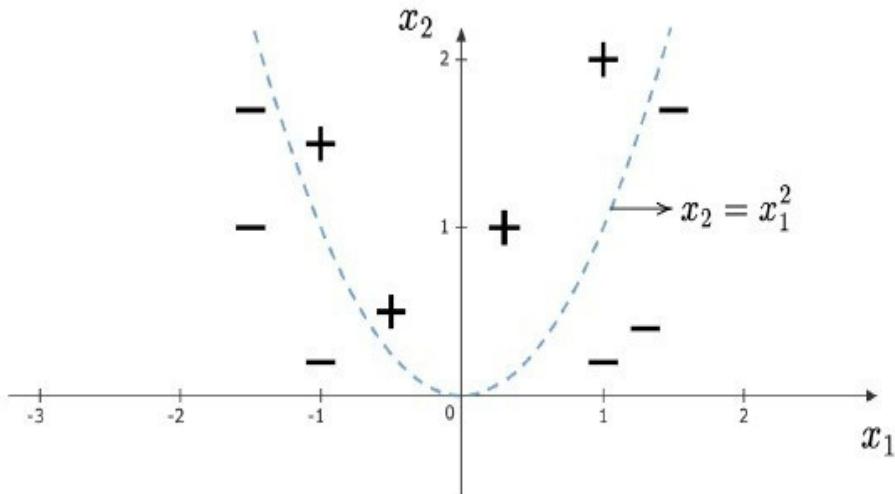
Question Number : 64 Question Id : 6406531279395 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider a dataset D_1 for a binary classification problem in \mathbb{R}^2 as given below.

The positive and negative data-points are represented using the symbols + and - respectively:



Let D_2 be the set of data-points obtained from D_1 under the following transformation:

$$(x_1, x_2) \rightarrow (x_1^2, x_2)$$

Which of the following statements are true?

Options :

6406534313582. ✓ D_2 is linearly separable

6406534313583. ✓ The perceptron learning algorithm will converge on D_2

6406534313584. ✗ D_1 is linearly separable

6406534313585. ✗ The perceptron learning algorithm will converge on D_1

Sub-Section Number :

4

Sub-Section Id :

640653201903

Question Shuffling Allowed :

Yes

Question Number : 65 Question Id : 6406531279396 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Let f be a Boolean function with 10 inputs. It is represented exactly using a network of perceptrons with one hidden layer and one perceptron in the output layer. Let k be the sufficient number of perceptrons needed in the hidden layer to represent f exactly. Enter the value of k .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1024

Question Number : 66 Question Id : 6406531279397 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

To learn the parameters of a neural network for a classification problem, mini-batch gradient descent is run on a dataset of size 1000 with batch size of 25 for 10 epochs. Find the number of times each parameter is updated.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

400

Sub-Section Number :

5

Sub-Section Id :

640653201904

Question Shuffling Allowed :

No

Question Id : 6406531279398 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (67 to 69)

Question Label : Comprehension

Let $h : \{0, 1\}^5 \rightarrow \{0, 1\}$ be a Boolean function. Consider an MP neuron with five binary inputs, all of which are excitatory. The output of the neuron is given as follows:

$$f(x_1, \dots, x_5) = \begin{cases} 1, & x_1 + \dots + x_5 \geq \theta \\ 0, & \text{otherwise} \end{cases}$$

θ is a positive integer. $f(x_1, \dots, x_5) = h(x_1, \dots, x_5)$ for all tuples $(x_1, \dots, x_5) \in \{0, 1\}^5$.

The given sub-questions are independent of each other.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 67 Question Id : 6406531279399 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

If $\theta = 1$, which of the following are true?

Options :

6406534313588. ✓ h is the OR function

6406534313589. ✓ h is a linearly separable Boolean function

6406534313590. ✗ h is the AND function

6406534313591. ✗ h is neither OR nor AND

6406534313592. ✗ h is not a linearly separable Boolean function

Question Number : 68 Question Id : 6406531279400 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

$h(x_1, \dots, x_5) = 0$ for 26 out of

the 32 input tuples and $h(x_1, \dots, x_5) = 1$

for the rest. Enter the value of θ . _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

4

Question Number : 69 Question Id : 6406531279401 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

Is there a value of θ for which $h(x_1, \dots, x_5) = 1$ for exactly 16 tuples and $h(x_1, \dots, x_5) = 0$ for the rest?
If there is such a θ , enter the value. If no such θ exists, enter -1 as the answer.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

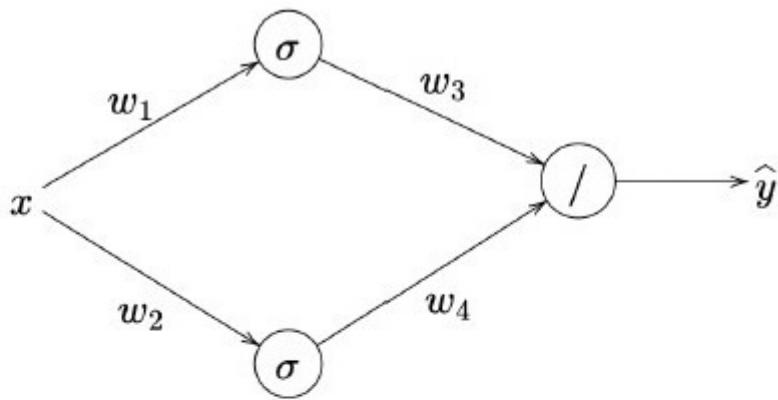
3

Question Id : 6406531279402 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (70 to 71)

Question Label : Comprehension

Consider a neural network for a regression problem with one input and one output. There is one hidden layer with two sigmoid neurons. The output layer is linear. Ignore biases in all units.



The loss function for a training sample (x, y) is given as:

$$L(y, \hat{y}) = \frac{1}{2} \cdot (\hat{y} - y)^2$$

The following values are given to you:

$$\begin{array}{ll} w_1 = 1, w_3 = 8 & x = -\log_e 3 \\ w_2 = 1, w_4 = -4 & y = 1 + \frac{1}{\log_e 3} \end{array}$$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 70 Question Id : 6406531279403 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

Enter the value of \hat{y} .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

Question Number : 71 Question Id : 6406531279404 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

Enter the value of $\frac{\partial L}{\partial w_1}$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1.5

Question Id : 6406531279405 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (72 to 73)

Question Label : Comprehension

Consider a neural network for a multi-class classification problem with 5 classes and with input $\in \mathbb{R}^{20}$. The network has 2 hidden layers, each with 10 sigmoid neurons. The output layer has 5 neurons (one for each class) and uses the softmax activation function. Cross entropy loss is used (use \log_e). Ignore biases for all neurons.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 72 Question Id : 6406531279406 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

Find the number of weights in the network.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

350

Question Number : 73 Question Id : 6406531279407 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

If all the weights in the network have the same value, find the cross entropy loss for an arbitrary data-point. If this can be computed, enter the value of the loss correct to two places after the decimal. If the information provided is not sufficient to compute the loss, enter -1 as the answer.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

1.59 to 1.63

Sub-Section Number : 6

Sub-Section Id : 640653201905

Question Shuffling Allowed : No

Question Id : 6406531279408 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (74 to 75)

Question Label : Comprehension

Consider the task of minimizing the function $f(x, y) = x^2 + y^2$.

We compare two approaches: gradient descent and momentum based gradient descent. Let (x_0, y_0) be some arbitrary point in the plane other than the origin.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 74 Question Id : 6406531279409 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

Starting at (x_0, y_0) , run two steps of gradient descent with learning rate

$\eta = 0.2$ to obtain (x_2, y_2) . If

$(x_2, y_2) = \alpha \cdot (x_0, y_0)$, enter the value of α correct to two places after the decimal. Note that the sequence of iterates will be: $(x_0, y_0) \rightarrow (x_1, y_1) \rightarrow (x_2, y_2)$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.35 to 0.37

Question Number : 75 Question Id : 6406531279410 Question Type : SA

Correct Marks : 6

Question Label : Short Answer Question

Starting at (x_0, y_0) , we now turn to momentum based gradient descent. The momentum updates are given below. Starting with $u_{-1} = (0, 0)$ and $\eta = 0.2$,

we have:

$$u_t = \beta u_{t-1} + \nabla f(x, y) \Big|_{(x_t, y_t)}$$

$$(x_{t+1}, y_{t+1}) = (x_t, y_t) - \eta u_t$$

What should be the momentum parameter β so that running two steps of momentum based gradient descent takes us to the global minimum? Note that the sequence of iterates will be:

$$(x_0, y_0) \rightarrow (x_1, y_1) \rightarrow (x_2, y_2),$$

where (x_2, y_2) is the global minimum of f . Enter your answer correct to two places after the decimal.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.89 to 0.91

Programming in C

Section Id :	64065391698
Section Number :	5
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	18
Number of Questions to be attempted :	18
Section Marks :	50
Display Number Panel :	Yes

Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653201906
Question Shuffling Allowed :	No

Question Number : 76 Question Id : 6406531279411 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : PROGRAMMING IN C (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 :

6406534313601. ✓ YES

6406534313602. ✗ NO

Sub-Section Number :	2
Sub-Section Id :	640653201907
Question Shuffling Allowed :	Yes

Question Number : 77 Question Id : 6406531279412 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Select the correct statement about peripherals in a computer.

Options :

6406534313603. ✓ CPU reads the values from the peripherals by reading the value at the memory address mapped to them.

6406534313604. ✗ CPU has separate instructions for performing read and write from a peripheral.

6406534313605. ✗ CPU cannot read the values from the peripherals

6406534313606. ✗ There is a standard and fixed memory mappings for each input device.

Question Number : 78 Question Id : 6406531279413 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Identify the option that arranges the following memory types in **typical** descending order of size (from largest to smallest).

Options :

6406534313607. ✘ Main Memory (RAM), Secondary Memory (Hard Drive), Cache Memory, Registers

6406534313608. ✘ Main Memory (RAM), Secondary Memory (Hard Drive), Registers, Cache Memory

6406534313609. ✓ Secondary Memory (Hard Drive), Main Memory (RAM), Cache Memory, Registers

6406534313610. ✘ Secondary Memory (Hard Drive), Registers, Main Memory (RAM), Cache Memory

Question Number : 79 Question Id : 6406531279415 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Which of the following best describes the C programming language?

Options :

6406534313615. ✘ High-level, object-oriented, interpreted

6406534313616. ✘ High-level, unstructured, compiled

6406534313617. ✓ Mid-level, structured, compiled

6406534313618. ✘ Low-level, procedural, interpreted

Question Number : 80 Question Id : 6406531279417 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Convert the binary number **1101101** to its decimal equivalent.

Options :

6406534313623. ✓ 109

6406534313624. ✘ 101

6406534313625. ✘ 117

6406534313626. ✘ 93

Sub-Section Number :

3

Sub-Section Id :

640653201908

Question Shuffling Allowed :

Yes

Question Number : 81 Question Id : 6406531279414 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the computations given below using the generalized memory model.

1. $M[0] \leftarrow x$
2. $M[1] \leftarrow y$
3. $M[2] \leftarrow M[0] * M[0]$
4. $M[3] \leftarrow M[1] * M[1]$
5. $M[4] \leftarrow 2 * M[0] * M[1]$
6. $M[5] \leftarrow M[2] + M[4]$
7. $M[6] \leftarrow M[3] - M[4]$
8. $M[6] \leftarrow M[5] + M[6]$

What is the value of $M[6]$ at the end of the execution?

Options :

6406534313611. ✓ $x^2 + y^2$

6406534313612. ✗ $x^2 + y^2 - 2xy$

6406534313613. ✗ $x^2 - y^2$

6406534313614. ✗ $y^2 - x^2$

Question Number : 82 Question Id : 6406531279421 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

What will be the output of the following code?

```
#include <stdio.h>
int main() {
    int count = 0;
    for (int i = 1; i <= 3; i++) {
        for (int j = 1; j <= 3; j++) {
            if ((i + j) % 2 == 0)
                count++;
        }
    }
    printf("%d\n", count);
    return 0;
}
```

Options :

6406534313639. ✘ 3

6406534313640. ✓ 5

6406534313641. ✘ 6

6406534313642. ✘ 4

Sub-Section Number :

4

Sub-Section Id :

640653201909

Question Shuffling Allowed :

Yes

Question Number : 83 Question Id : 6406531279416 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

A CPU architecture features an instruction set with **30 unique instructions**. Each instruction consistently uses **three operands**. Every operand needs to address any of **256 distinct general-purpose registers**. What is the minimum number of bits necessary to encode one such instruction?

Options :

6406534313619. ✘ 28

6406534313620. ✓ 29

6406534313621. ✘ 30

6406534313622. ✘ 26

Question Number : 84 Question Id : 6406531279418 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

What is the decimal equivalent of the 2's complement 8-bit number **11111010**?

Options :

6406534313627. ✘ 250

6406534313628. ✓ -6

6406534313629. ✘ -5

6406534313630. ✘ 6

Question Number : 85 Question Id : 6406531279419 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

What will be the values of variables a, b, c, and d at the end of execution of the following C program?

```
#include <stdio.h>
int main()
{
    int a = 10;
    int b = 13;
    int c = a++ + ++b;
    int d = c++ + a--;
    return 0;
}
```

Options :

6406534313631. ✓ a = 10, b = 14, c = 25, d = 35

6406534313632. ✘ a = 11, b = 14, c = 23, d = 34

6406534313633. ✘ a = 10, b = 14, c = 23, d = 34

6406534313634. ✘ a = 10, b = 14, c = 24, d = 35

Question Number : 86 Question Id : 6406531279420 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

What will be the output of the following code?

```
#include <stdio.h>
int main() {
    int x = 10, y = 4, z = 2;
    x /= y %= z += 3;
    printf("%d %d %d", x, y, z);
    return 0;
}
```

Options :

6406534313635. ✘ 10 4 5

6406534313636. ✘ 2 0 2

6406534313637. ✘ 5 4 5

6406534313638. ✓ 2 4 5

Sub-Section Number :

5

Sub-Section Id :

640653201910

Question Shuffling Allowed :

Yes

Question Number : 87 Question Id : 6406531279422 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

The 8-bit binary number, **10000000** represents which of the following?

Options :

6406534313643. ✓ 128 in unsigned representation

6406534313644. ✓ -128 in 2's complement representation

6406534313645. ✘ 128 in 2's complement representation

6406534313646. ✘ -1 in 1's complement representation

Question Number : 88 Question Id : 6406531279424 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following combinations of the integer values a, b, c makes the variable x to get the value 10 in the following expression?

```
x = (a > b) ? ((a > c) ? a : c) :((b > c) ? b : c)
```

Options :

6406534313652. ✘ a=12, b=10, c=5

6406534313653. ✘ a=15, b=9, c=10

6406534313654. ✓ a=8, b=6, c=10

6406534313655. ✓ a=10, b=5, c=7

Sub-Section Number :

6

Sub-Section Id :

640653201911

Question Shuffling Allowed :

Yes

Question Number : 89 Question Id : 6406531279423 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following is/are valid C variable names?

Options :

6406534313647. ✓ my_variable_name

6406534313648. ✘ break

6406534313649. ✓ variableName123

6406534313650. ✓ ValidName

6406534313651. ✘ 2ndName

Sub-Section Number :

7

Sub-Section Id :

640653201912

Question Shuffling Allowed :

Yes

Question Number : 90 Question Id : 6406531279425 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

Consider the following assembly program (anything after ; is a comment).

```
MOV R1, 5          ; Move the integer value 5 into register R1
MOV R2, 3          ; Move the integer value 3 into register R2
MOV R3, 0          ; Initialize R3 with 0
MOV R4, 0          ; Initialize R4 with 0
LOOP:
    INC R3        ; Increment R3 by 1
    CMP R3, R1      ; Compare R3 with R1
    JG END          ; If R3 is Greater than R1, jump to END
    CMP R3, R2      ; Compare R3 with R2
    JE SKIP_ADD    ; If R3 is Equal to R2, jump to SKIP_ADD
    ADD R4, R3      ; Add R3 to R4
SKIP_ADD:
    JMP LOOP        ; Jump back to LOOP
END
```

What will be the final value stored in R4 at the end of the program?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

12

Question Number : 91 Question Id : 6406531279427 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

What will be the output of the following code?

```
#include <stdio.h>

int main() {
    int a = 5, b = 10, c = 7;
    int output;

    if (a > b) {
        if (a > c) {
            output = a;
        } else {
            output = c;
        }
    } else {
        if (b > c) {
            output = b;
        } else {
            output = c;
        }
    }
    printf("%d", output);
    return 0;
}
```

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Sub-Section Number : 8

Sub-Section Id : 640653201913

Question Shuffling Allowed : Yes

Question Number : 92 Question Id : 6406531279426 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

What will be the output of the following code?

```
#include <stdio.h>

int main() {
    char option = 'B';
    int points = 100;

    switch (option) {
        case 'A':
            points -= 50;
            break;
        case 'B':
            points /= 4;
        case 'C':
            points += 5;
        case 'D':
            points -= 3;
            break;
        case 'E':
            points = 0;
            break;
    }
    printf("%d", points);
    return 0;
}
```

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

27

Question Number : 93 Question Id : 6406531279428 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

What will be the output of the following code?

```
#include <stdio.h>

int main() {
    int product = 1;
    int n = 4;

    while (n > 0) {
        product = product * n;
        n = n - 1;
    }
    printf("%d", product);
    return 0;
}
```

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

24

Computer System Design

Section Id :	64065391699
Section Number :	6
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	13
Number of Questions to be attempted :	13
Section Marks :	50
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0

Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653201914
Question Shuffling Allowed :	No

Question Number : 94 Question Id : 6406531279429 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : COMPUTER SYSTEM DESIGN (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 :

6406534313660. ✓ YES

6406534313661. ✗ NO

Sub-Section Number :	2
Sub-Section Id :	640653201915
Question Shuffling Allowed :	Yes

Question Number : 95 Question Id : 6406531279430 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

If $(143)_a = (212)_b$, where a and b are the bases of the respective numbers, what are the values of a and b ?

Options :

6406534313662. ✗ $a = 6, b = 5$

6406534313663. ✗ $a = 8, b = 5$

6406534313664. ✓ $a = 7, b = 6$

6406534313665. ✗ $a = 9, b = 7$

6406534313666. ✗ $a = 5, b = 4$

Question Number : 96 Question Id : 6406531279431 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

What will be the output of the given circuit, as shown below?

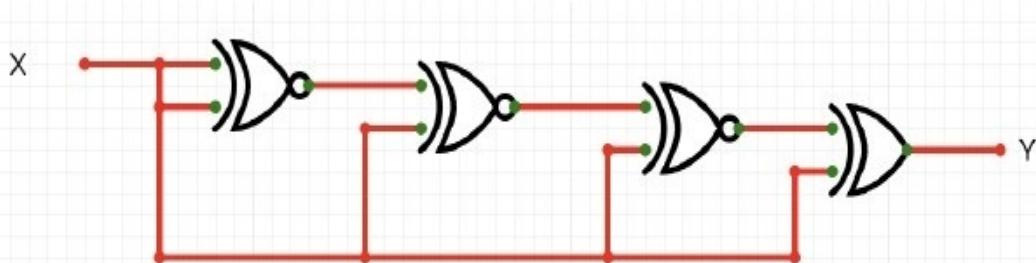


Figure 1: Circuit Diagram

Options :

6406534313667. ✘ X

6406534313668. ✓ \overline{X}

6406534313669. ✘ 1

6406534313670. ✘ 0

Question Number : 97 Question Id : 6406531279433 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the given boolean function of three variables: $f(x, y, z) = \sum(1, 2, 4, 7)$.

For which of the following conditions on inputs x , y and z , the output f is always at logic 1?

Options :

6406534313676. ✓ Exactly one input is at logic 1

6406534313677. ✘ All inputs are at logic 1

6406534313678. ✘ Any two inputs are at logic 0

6406534313679. ✘ Any even number of inputs are at logic 1

Question Number : 98 Question Id : 6406531279434 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Given the Boolean function in sum of minterms form:

$$F(A, B, C) = \sum(0, 2, 3, 6).$$

Which of the following is the correct minimized POS (product of sums) expression?

Options :

6406534313680. ✘ $(A + B)(\overline{A} + \overline{C})$

6406534313681. ✘ $(\overline{A} + B + C)(A + \overline{B})$

6406534313682. ✓ $(A + \overline{B})(\overline{A} + \overline{C})$

6406534313683. ✘ None of these

Sub-Section Number :

3

Sub-Section Id :

640653201916

Question Shuffling Allowed :

Yes

Question Number : 99 Question Id : 6406531279432 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

Consider the following circuit.

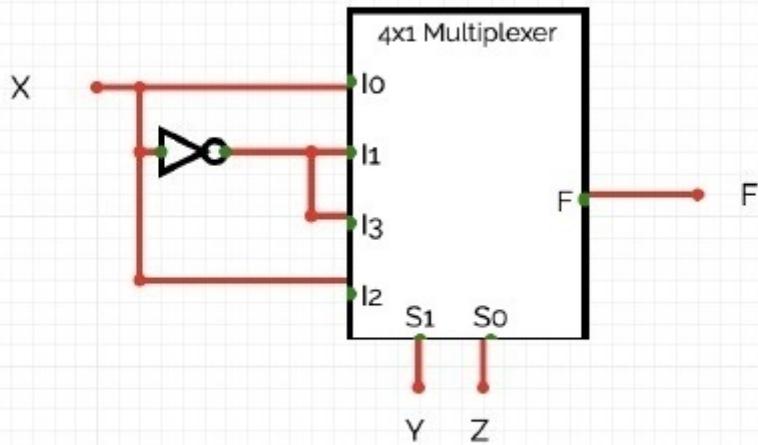


Figure 2: Circuit Diagram

What will be the output F for the circuit diagram above?

Options :

6406534313671. ✘ $X(\overline{Z} + YZ) + \overline{X} \cdot Y \cdot Z$

6406534313672. ✓ $X(\overline{Z} + YZ) + \overline{X} \cdot \overline{Y} \cdot Z$

6406534313673. ✘ $X(Z + YZ) + \overline{X} \cdot \overline{Y} \cdot Z$

6406534313674. ✘ $X(\overline{Z} + YZ) + X \cdot \overline{Y} \cdot Z$

6406534313675. ✘ None of these

Question Number : 100 Question Id : 6406531279435 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

Consider the circuit shown below. Given that the inputs are supplied uniformly random, what is the probability of the output F being at logic 1?

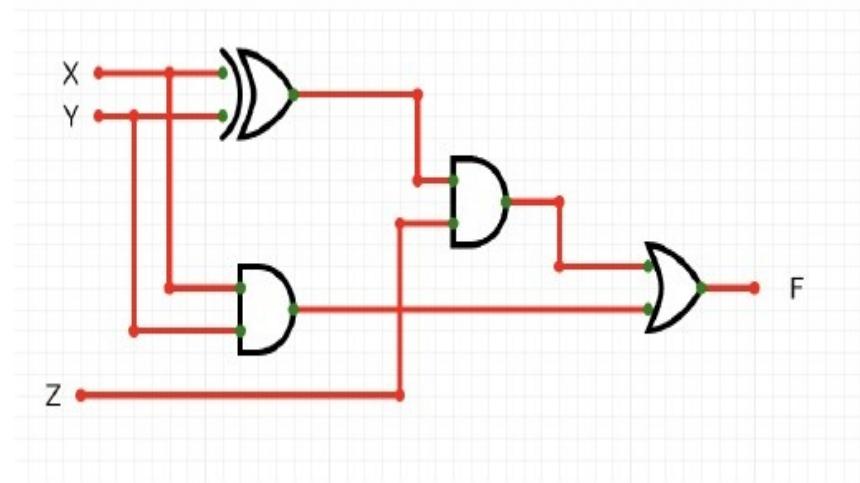


Figure 3: Circuit diagram

Options :

6406534313684. ✘ 0.75

6406534313685. ✘ 0.33

6406534313686. ✘ 0.25

6406534313687. ✓ 0.50

6406534313688. ✘ 1

6406534313689. ✘ None of these

Sub-Section Number :

4

Sub-Section Id :

640653201917

Question Shuffling Allowed :

Yes

Question Number : 101 Question Id : 6406531279436 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

What is the minimum number of 2:1 multiplexers required to design the circuit that implements the function $F(X, Y, Z) = (4, 5, 6, 7)$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

Question Number : 102 Question Id : 6406531279440 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

Answer the following question based on given timing diagram.

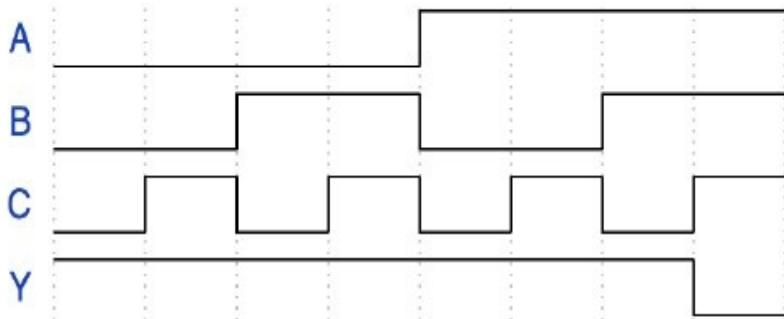


Figure 4: Timing Diagram

Given that we only have 2-input NAND gates, what is the minimum number of NAND gates needed to represent a circuit with an output timing diagram same as Y?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

3

Sub-Section Number : 5

Sub-Section Id : 640653201918

Question Shuffling Allowed : Yes

Question Number : 103 Question Id : 6406531279437 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

If the representation of a number in base 6 is 431, what will be its hexadecimal representation?

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

A3

Question Number : 104 Question Id : 6406531279439 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Given that the **NOT** gate has a delay of 1 ns, and 2-input **AND/OR** gates have delays of 2 ns, what will be the maximum delay of a **2x1** multiplexer circuit?

Note: if the answer is 1 ns, write 1.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

5

Sub-Section Number : 6

Sub-Section Id : 640653201919

Question Shuffling Allowed : Yes

Question Number : 105 Question Id : 6406531279438 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

What is the minimum number of 2 input NAND gates to realize the Boolean function,
 $F = (\overline{X} + \overline{Y})(Z + W)$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

4

Question Number : 106 Question Id : 6406531279441 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

Consider the circuit diagram shown below.

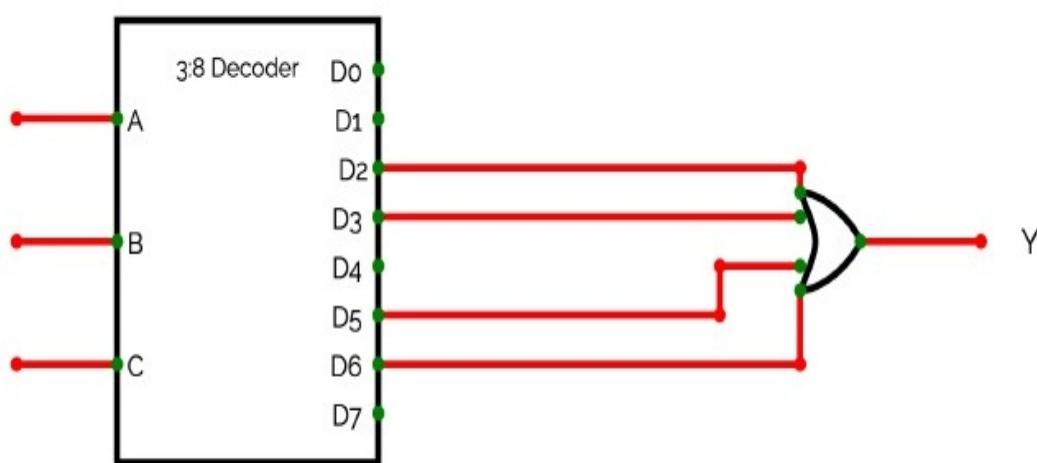


Figure 5: Circuit Diagram

Given that we only have 2-input XOR gates, what is the minimum number of NAND gates needed to represent the circuit diagram above?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

2

Advanced Algorithms

Section Id :	64065391700
Section Number :	7
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	9
Number of Questions to be attempted :	9
Section Marks :	50
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653201920
Question Shuffling Allowed :	No

Question Number : 107 Question Id : 6406531279442 Question Type : MCQ

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 :

6406534313696. ✓ YES

6406534313697. ✗ NO

Sub-Section Number :	2
Sub-Section Id :	640653201921
Question Shuffling Allowed :	No

Question Id : 6406531279443 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (108 to 110)

Question Label : Comprehension

Consider a universe $U = \{p_1, \dots, p_{2n}\}$ of n couples. A subset $S \subseteq U$ is *good* if it has at most three couples in it. Consider the family of all good sets. What can you say about this family?

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 108 Question Id : 6406531279444 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

The family satisfies the hereditary property, that is, if A is a good set and $B \subset A$, then B is also a good set.

Options :

6406534313698. ✓ True

6406534313699. ✗ False

Question Number : 109 Question Id : 6406531279445 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Consider two good A and B where $|A| > |B|$ and $A \cap B = \emptyset$. Then there exists an element $x \in A \setminus B$ such that $B \cup \{x\}$ is a good set.

Options :

6406534313700. ✓ True

6406534313701. ✗ False

Question Number : 110 Question Id : 6406531279446 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Recall that the exchange property is the following. If A and B are good sets and $|A| > |B|$ then there exists an element $x \in A \setminus B$ such that $B \cup \{x\}$ is a good set. The family of all good sets satisfies the exchange property. Note that we make no assumption about $A \cap B$ unlike the previous question.

Options :

6406534313702. ✓ True

6406534313703. ✗ False

Sub-Section Number :	3
Sub-Section Id :	640653201922
Question Shuffling Allowed :	No

Question Id : 6406531279447 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Question Numbers : (111 to 113)

Question Label : Comprehension

Consider the given problem, called BoxDepth: Given a set of n axis-aligned rectangles in the plane, how big is the largest subset of these rectangles that contain a common point?

For each statement given in the subquestions, determine if it is true or false.

Sub questions

Question Number : 111 Question Id : 6406531279448 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

There is a polynomial-time reduction from BoxDepth to MaxClique.

Options :

6406534313704. ✓ True

6406534313705. ✗ False

Question Number : 112 Question Id : 6406531279449 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

There is a polynomial-time algorithm for BoxDepth.

Options :

6406534313706. ✓ True

6406534313707. ✗ False

Question Number : 113 Question Id : 6406531279450 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Only one of the statements in the previous question can be true assuming $P \neq NP$.

Options :

6406534313708. ✗ True

6406534313709. ✓ False

Sub-Section Number :	4
Sub-Section Id :	640653201923
Question Shuffling Allowed :	Yes

Question Number : 114 Question Id : 6406531279451 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Suppose your friend comes up with an algorithm to solve Partition in time $O(nM)$, where n is the size of the input set and M is the sum of the absolute values of its elements. Which of the following statements is correct?

Options :

6406534313710. ❌ Such an algorithm cannot be possibly correct, since it runs in polynomial time and Partition is NP-hard.

6406534313711. ✓ Even if such an algorithm exists, then it does not imply that P=NP.

Question Number : 115 Question Id : 6406531279452 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

The problem AllOrNothing3Sat asks, given a 3CNF boolean formula, whether there is an assignment to the variables such that each clause either has three True literals or has three False literals.

Consider the following statements:

- (1) There is a polynomial-time algorithm to solve AllOrNothing3Sat.
- (2) There is a polynomial-time reduction from 3SAT to AllOrNothing3Sat.

Assuming P \neq NP, which of the following is true?

Options :

6406534313712. ❌ Both statements are true.

6406534313713. ✓ Statement (1) is true and statement (2) is false.

6406534313714. ❌ Statement (1) is false and statement (2) is true.

6406534313715. ❌ Both statements are false.

Sub-Section Number :

5

Sub-Section Id :

640653201924

Question Shuffling Allowed :

Yes

Question Number : 116 Question Id : 6406531279453 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements is true about a flow network?

Options :

6406534313716. ✓ Increasing the capacity of *one* edge (u,v) by 1 can result in an increase of at most 1 in the max flow.

6406534313717. ✗ Increasing the capacity of *one* edge (u,v) by 1 will result in an increase of at least 1 in the max flow.

6406534313718. ✓ Decreasing the capacity of *one* edge (u,v) by 1 can result in a decrease of at most 1 in the max flow.

6406534313719. ✗ Decreasing the capacity of *one* edge (u,v) by 1 will result in a decrease of at least 1 in the max flow.

Sub-Section Number :

6

Sub-Section Id :

640653201925

Question Shuffling Allowed :

Yes

Question Number : 117 Question Id : 6406531279454 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Given a flow network (G, s, t, c) and a flow f , how will you determine if f is maximum flow?

Options :

6406534313720. ✗ If there is any edge that is not saturated to full capacity, then we can conclude that f is not a maximum flow.

6406534313721. ✓ If the residual graph does not have any augmenting paths then f is a maximum flow.

6406534313722. ✗ If the value of the flow f is not the sum of the capacities of the edges coming out of the source s then f is not a maximum flow.

6406534313723. ✗ If the value of the flow f is not the sum of the capacities of the edges coming into the sink t then f is not a maximum flow.

Sub-Section Number :

7

Sub-Section Id :

640653201926

Question Shuffling Allowed :

No

Question Id : 6406531279455 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (118 to 121)

Question Label : Comprehension

In this question, we consider a card game called SWISH.

In the commercial version of SWISH, there are 60 *transparent* cards. Those cards are made up of three columns and four rows, they are obtained by placing a point in each of the four possible positions (accounting for symmetries), and then a circle in each of the other possible positions. Some example cards are shown below.

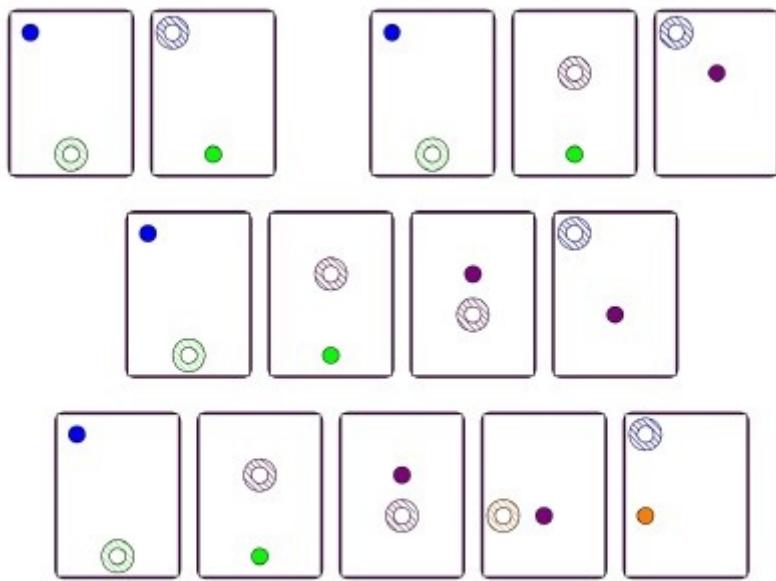


Figure 1: Examples of swish cards.

The generalized version of SWISH is played on cards of height h and width w . Cards can have one or several symbols, which can be points or circles. For a given card C , we denote by $C[a][b]$ the spot in row a and column b . Both the generalized version and the physical card game have the same goal: from a set \mathcal{C} of cards, the players try to create a *swish*, that is, a subset $\mathcal{S} \subseteq \mathcal{C}$ such that every card is in the same orientation, every point meets a circle, every circle meets a point, and no two points or two circles meet.

The cards can still be flipped or rotated, which can also be seen as applying axial (vertical or horizontal) or central symmetry. An example is shown below:

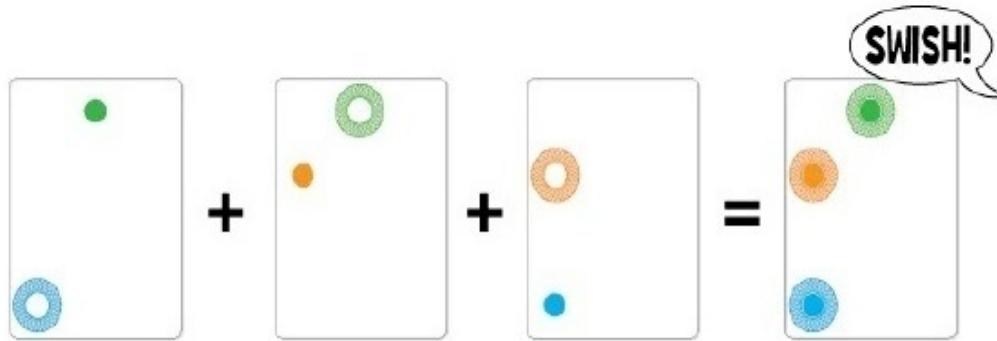


Figure 2: An example of a swish.

Since the cards are drawn from the deck at random, the players cannot anticipate what is going to come next. Hence, we will assume that they will try to maximize their given score at each round of the game. Thus, the question that we ask is the following: given a set of cards, can we find a swish that is as large as possible? This optimization question leads to the decision problem SWISH:

Instance. A set \mathcal{C} of cards, an integer k .
Question. Is there a swish $\mathcal{S} \subseteq \mathcal{C}$ such that $|\mathcal{S}| \geq k$?

We find this problem challenging in general, so we devise SWISH-SPECIAL, which is the following special case:

Instance. A set \mathcal{C} of cards, an integer k , where every card has at most one symbol.
Question. Is there a swish $\mathcal{S} \subseteq \mathcal{C}$ such that $|\mathcal{S}| \geq k$?

What can you say about SWISH-SPECIAL? Assume P \neq NP.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 118 Question Id : 6406531279456 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

SWISH-SPECIAL is in P.

Options :

6406534313724. ✓ True

6406534313725. ✗ False

Question Number : 119 Question Id : 6406531279457 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

SWISH-SPECIAL is in NP.

Options :

6406534313726. ✘ True

6406534313727. ✓ False

Question Number : 120 Question Id : 6406531279458 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

SWISH-SPECIAL is NP-hard.

Options :

6406534313728. ✘ True

6406534313729. ✓ False

Question Number : 121 Question Id : 6406531279459 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

SWISH-SPECIAL is NP-complete.

Options :

6406534313730. ✘ True

6406534313731. ✓ False

Sub-Section Number : 8

Sub-Section Id : 640653201927

Question Shuffling Allowed : No

Question Id : 6406531279460 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (122 to 133)

Question Label : Comprehension

Let n and N be positive integers, and let \mathcal{F} be an arbitrary nonempty family of subsets of the universe $\{1, \dots, n\}$. Suppose each element $x \in \{1, \dots, n\}$ in the universe receives an integer weight $w(x)$, each of which is chosen independently and uniformly at random from $\{1, \dots, N\}$. The weight of a set S in \mathcal{F} is defined as

$$w(S) = \sum_{x \in S} w(x)$$

We want to explore the probability of the following “good” event: *there is a unique set in \mathcal{F} that has the minimum weight among all sets of \mathcal{F} .*

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 122 Question Id : 6406531279461 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Suppose $n = 3, N = 100$ and the family \mathcal{F} consists of the following sets:

$$\mathcal{F} = \{\{1, 2\}, \{2, 3\}, \{3\}\}.$$

Suppose the randomly assigned weights are:

$$w(1) = 30, w(2) = 20, w(3) = 50.$$

Is there a unique set in \mathcal{F} that has the minimum weight among all sets of \mathcal{F} ?

Options :

6406534313732. ✘ Yes

6406534313733. ✓ No

Question Number : 123 Question Id : 6406531279462 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Suppose $n = 2$, $N = 100$ and the randomly assigned weights are:

$$w(1) = 25, w(2) = 50$$

Consider all non-empty families \mathcal{F} over non-empty subsets of $\{1, 2\}$. There are seven such families. How many of them have a unique minimum-weight subset?

Options :

6406534313734. ✘ None

6406534313735. ✘ One

6406534313736. ✘ Three

6406534313737. ✓ All

Question Number : 124 Question Id : 6406531279463 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Suppose $n = 2$, $N = 100$ and the randomly assigned weights are:

$$w(1) = 25, w(2) = 25$$

Consider all non-empty families \mathcal{F} over non-empty subsets of $\{1, 2\}$. There are seven such families. How many of them *do not* have a unique minimum-weight subset?

Options :

6406534313738. ✘ None

6406534313739. ✓ One

6406534313740. ✘ Three

6406534313741. ✘ All

Question Number : 125 Question Id : 6406531279464 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Suppose $n = 2$, $N = 5$ and $\mathcal{F} = \{\{1\}, \{2\}\}$.

What is the probability of the good event?

Options :

6406534313742. ✘ 0

6406534313743. ✘ 1/5

6406534313744. ✓ 4/5

6406534313745. ✘ 1

Question Number : 126 Question Id : 6406531279465 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Suppose $n = 3, N = 100$ and

$$\mathcal{F} = \{\{1\}, \{1, 2\}, \{1, 2, 3\}\}.$$

What is the probability of the good event?

Options :

6406534313746. ✘ 0

6406534313747. ✘ 1/3

6406534313748. ✘ 2/3

6406534313749. ✓ 1

Question Number : 127 Question Id : 6406531279466 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Suppose $n = 3, N = 5$ and

$$\mathcal{F} = \{\{1, 2\}, \{1, 3\}, \{2, 3\}\}.$$

Note that there are 125 possible weight functions overall. How many of these lead to a good event?

Options :

6406534313750. ✘ 25

6406534313751. ✘ 60

6406534313752. ✓ 90

6406534313753. ✘ 120

Question Number : 128 Question Id : 6406531279467 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Suppose $n = 3, N = 5$ and

$$\mathcal{F} = \{\{1\}, \{3\}, \{2, 3\}, \{1, 2\}\}.$$

Note that there are 125 possible weight functions overall. How many of these lead to a good event?

Options :

6406534313754. ✘ 25

6406534313755. ✘ 50

6406534313756. ✘ 90

6406534313757. ✓ 100

Question Number : 129 Question Id : 6406531279468 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

We introduce some notation:

- Let $\mathcal{P}_i \subseteq \mathcal{F}$ denote all those sets in \mathcal{F} that contain i , and
- let $\mathcal{Q}_i \subseteq \mathcal{F}$ denote all those sets in \mathcal{F} that do not contain i .

Notice that $\mathcal{Q}_i = \mathcal{F} \setminus \mathcal{P}_i$. For example,

if $\mathcal{F} = \{\{1\}, \{1, 2\}, \{2, 3\}\}$, then:

- $\mathcal{P}_1 = \{\{1\}, \{1, 2\}\}$ and $\mathcal{Q}_1 = \{\{2, 3\}\}$, and
- $\mathcal{P}_2 = \{\{1, 2\}, \{2, 3\}\}$ and $\mathcal{Q}_2 = \{\{1\}\}$, and
- $\mathcal{P}_3 = \{\{2, 3\}\}$ and $\mathcal{Q}_3 = \{\{1\}, \{1, 2\}\}$.

Let \mathcal{E}_i be the event:

$$\min \{w(S) : \mathcal{P}_i\} = \min \{w(S) : S \in \mathcal{Q}_i\}.$$

We can conclude that the good event occurs if:

Options :

6406534313758. ✓ None of the events \mathcal{E}_i occur

6406534313759. ✗ At least one of the events \mathcal{E}_i occur

6406534313760. ✗ Exactly one of the events \mathcal{E}_i occur

6406534313761. ✗ All of the events \mathcal{E}_i occur

Question Number : 130 Question Id : 6406531279469 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Further, if the good event occurs, then:

Options :

6406534313762. ✓ None of the events \mathcal{E}_i occur

6406534313763. ✗ At least one of the events \mathcal{E}_i occur

6406534313764. ✗ Exactly one of the events \mathcal{E}_i occur

6406534313765. ✘ All of the events \mathcal{E}_i occur

Question Number : 131 Question Id : 6406531279470 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Fix some $1 \leq i \leq n$. The probability that \mathcal{E}_i occurs is:

Options :

6406534313766. ✘ at most $1/n$

6406534313767. ✘ at least $1/n$

6406534313768. ✘ at most $1/2^n$

6406534313769. ✘ at least $1/2^n$

6406534313770. ✓ at most $1/N$

6406534313771. ✘ at least $1/N$

Question Number : 132 Question Id : 6406531279471 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Consider the problem of finding perfect matchings in a simple, undirected graph. Recall that the

Tutte matrix of a graph G , denoted Z_G , is given by:

$$Z_G[i, j] = \begin{cases} z_{ij} & \text{if } (i, j) \text{ is an edge and } i < j \\ -z_{ji} & \text{if } (i, j) \text{ is an edge and } j > i \\ 0 & \text{if } (i, j) \text{ is not an edge} \end{cases}$$

Suppose each edge is assigned a random weight in $\{1, \dots, 2m\}$, and \mathcal{F} is the set of perfect matchings. Further, let us replace each indeterminate z_{ij} in the Tutte matrix of the graph is replaced with $2^{w_{ij}}$ where w_{ij} is the randomly assinged weights of the edge (i, j) from above.

If G has no perfect matching, what is the determinant of Z with the variables substituted for these weights?

Options :

6406534313772. ✓ 0

6406534313773. ✘ 1

6406534313774. ✘ m

6406534313775. ✘ $m!$

Question Number : 133 Question Id : 6406531279472 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

We continue the notation from the previous question. Suppose the randomly assigned weights lead to the good event, that is, there is an unique perfect matching in G with minimum weight, and say this minimum weight is r . What can you say about the determinant of Z in this case?

Options :

6406534313776. ✘ r

6406534313777. ✘ 2^r

6406534313778. ✓ $2^r k$, where k is an odd number

6406534313779. ✘ $2^r \cdot k$, where k is an even number

LLM

Section Id :	64065391701
Section Number :	8
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	16
Number of Questions to be attempted :	16
Section Marks :	50
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes

Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653201928
Question Shuffling Allowed :	No

Question Number : 134 Question Id : 6406531279473 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : LARGE LANGUAGE MODELS (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 :

6406534313780. ✓ YES

6406534313781. ✗ NO

Sub-Section Number :	2
Sub-Section Id :	640653201929
Question Shuffling Allowed :	Yes

Question Number : 135 Question Id : 6406531279474 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Transformers process input tokens:

Options :

6406534313782. ✗ One at a time (sequentially)

6406534313783. ✗ In reverse order

6406534313784. ✓ All at once (in parallel)

6406534313785. ✗ Only after seeing the full input

Question Number : 136 Question Id : 6406531279475 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

What is the purpose of the softmax function in the attention mechanism?

Options :

6406534313786. ✓ Normalize attention scores to a probability distribution

6406534313787. ✗ Add non-linearity to the model

6406534313788. ✗ To predict the correct class for the loss function

6406534313789. ✗ Remove redundant features from the input

Question Number : 137 Question Id : 6406531279476 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

What is the main difference between GPT and BERT pre-training objectives?

Options :

6406534313790. ✗ GPT uses Masked Language Modeling, BERT uses Causal Language Modeling

6406534313791. ✓ GPT uses Causal Language Modeling, BERT uses Masked Language Modeling

6406534313792. ✗ Both use Masked Language Modeling

6406534313793. ✗ Both use Causal Language Modeling

Question Number : 138 Question Id : 6406531279477 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

In Top-K sampling for language generation, increasing the value of K typically has which of the following effects?

Options :

6406534313794. ✗ It makes the output more deterministic and repetitive.

6406534313795. ✗ It reduces the probability of selecting high-frequency words.

6406534313796. ✓ It increases the diversity of the generated text but may reduce coherence if K is too large.

6406534313797. ✗ It guarantees grammatical correctness by focusing on top-ranked tokens only.

Question Number : 139 Question Id : 6406531279478 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Why are residual connections important in transformer architectures?

Options :

- 6406534313798. ✘ They reduce memory consumption.
- 6406534313799. ✘ They add extra cost of compute by adding batch normalization.
- 6406534313800. ✓ They help in training deep networks by enabling gradient flow.
- 6406534313801. ✘ They remove the need for layer normalization.

Sub-Section Number : 3

Sub-Section Id : 640653201930

Question Shuffling Allowed : Yes

Question Number : 140 Question Id : 6406531279479 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements are true regarding causal language modeling (CLM)?

Options :

- 6406534313802. ✓ The model only attends to past and current tokens during training.
- 6406534313803. ✓ The model is trained by predicting the next token in a sequence.
- 6406534313804. ✘ The model uses bidirectional context.
- 6406534313805. ✘ The CLM objective is commonly used for encoder-only models.

Question Number : 141 Question Id : 6406531279480 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following are valid reasons why transformer-based large language models are widely used in natural language processing?

Options :

- 6406534313806. ✓ Transformers process input sequences in parallel, enabling faster training.
- 6406534313807. ✘ They use recurrence to remember long-term dependencies more effectively than LSTMs.
- 6406534313808. ✘ Transformers are limited to short text inputs due to their architecture.
- 6406534313809. ✓ Large transformer models can be fine-tuned for various NLP tasks using a single pre-trained model.

Question Number : 142 Question Id : 6406531279481 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which elements are included in BERT's input representation for Next Sentence Prediction?

Options :

6406534313810. ✓ [CLS] token at the beginning of input.

6406534313811. ✓ [SEP] token to separate sentence A and sentence B.

6406534313812. ✓ Segment embeddings to distinguish sentence A and sentence B.

6406534313813. ✗ Position embeddings are not required for Next Sentence Prediction.

Question Number : 143 Question Id : 6406531279482 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

How does Top-p (nucleus) sampling differ from Top-K sampling in language generation?

Options :

6406534313814. ✗ It samples only from a fixed number of tokens at each step.

6406534313815. ✓ It samples from the smallest set of tokens whose cumulative probability exceeds p.

6406534313816. ✗ It always selects the top-p tokens with equal probability.

6406534313817. ✗ It guarantees diversity by selecting all low-probability tokens.

Sub-Section Number :

4

Sub-Section Id :

640653201931

Question Shuffling Allowed :

Yes

Question Number : 144 Question Id : 6406531279483 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider the embedding vector for a word, $x = [0.5, -0.4, 0.3, -0.2]^T$. Suppose the word is at position 3 in the given sentence. Add the corresponding position embedding p to the word embedding to get h , i.e. the sum of the elements in $h = x + p$. Use the fixed sinusoidal position embedding vector calculated using the formula given below

$$PE(pos, 2i) = \sin\left(\frac{pos}{10000^{2i/dmodel}}\right)$$

$$PE(pos, 2i + 1) = \cos\left(\frac{pos}{10000^{2i/dmodel}}\right)$$

What is the value of $h[0] - h[1]$ i.e. subtract second element from the first element of h vector ? (Answer correct up to 2 values after the decimal)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

1.98 to 2.08

Question Number : 145 Question Id : 6406531279484 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Suppose a language model outputs the following logits for a vocabulary of size 4:

Token	Logit
the	2.0
sky	1.0
is	0.5
blue	-1.0

You apply temperature scaling with temperature $T = 0.5$. After applying the softmax on the temperature-scaled logits, what is the probability assigned to the token “the”? (Give your answer up to 2 decimal places)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.81 to 0.87

Question Number : 146 Question Id : 6406531279485 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

A transformer generates the following attention weights for a token over four positions: [0.1, 0.2, 0.5, 0.2]. The corresponding value vectors are:

$v1=[1,0]$, $v2=[0,1]$, $v3=[1,1]$, $v4=[2,1]$

Compute the output vector from the attention mechanism by taking the weighted sum of the value vectors, and return the first element of the resulting vector. (Round to 2 decimal places)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.9 to 1.1

Sub-Section Number :

5

Sub-Section Id :

640653201932

Question Shuffling Allowed :

No

Question Id : 6406531279486 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (147 to 149)

Question Label : Comprehension

Question Description

- Embedding dimension : $d_{model} = 4$
- Input sequence (sequence length = 2, $d_{model} = 4$) :

$$X = \begin{bmatrix} 1 & 0 \\ 0 & 2 \\ 1 & 0 \\ 0 & 2 \end{bmatrix}$$

- Number of heads: 2 (each head operates on 2 dimensions)
- For both the heads $d_K = d_Q = d_V = 2$
- Weight matrices for W_Q, W_K, W_V first head :

$$W_Q^1, W_K^1, W_V^1 = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 2 & 2 & 2 & 2 \end{bmatrix}$$

- Weight matrices for W_Q, W_K, W_V second head :

$$W_Q^2, W_K^2, W_V^2 = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 1 & 1 & 2 & 1 \end{bmatrix}$$

- The output from both heads are concatenated, then projected by:

$$W_O = \begin{bmatrix} 0.5 & 0 & 0 & 0 \\ 0 & 0.5 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Scaled Dot-Product Attention (Q, K, V) = $\text{softmax} \left(\frac{Q^T K}{\sqrt{d_k}} \right) V^T$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 147 Question Id : 6406531279487 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Select the scaled dot-product attention for the first head:

Options :

6406534313821. *

$$\begin{bmatrix} 0 & 0 \\ 1 & 1 \end{bmatrix}$$

6406534313822. ✓ $\begin{bmatrix} 0 & 0 \\ 6 & 12 \end{bmatrix}$

6406534313823. ✗ $\begin{bmatrix} 1.46 & 2.92 \\ 4.53 & 9.08 \end{bmatrix}$

6406534313824. ✗ $\begin{bmatrix} 1.98 & 3.76 \\ 4.02 & 8.31 \end{bmatrix}$

Question Number : 148 Question Id : 6406531279488 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Select the scaled dot-product attention for the second head:

Options :

6406534313825. ✓ $\begin{bmatrix} 1.34 & 2.23 \\ 0.66 & 4.77 \end{bmatrix}$

6406534313826. ✗ $\begin{bmatrix} 2.33 & 1.32 \\ 2.94 & 3.76 \end{bmatrix}$

6406534313827. ✗ $\begin{bmatrix} 1.96 & 1.68 \\ 3.04 & 2.32 \end{bmatrix}$

6406534313828. ✗ $\begin{bmatrix} 2.65 & 2.6 \\ 2.58 & 2.32 \end{bmatrix}$

Question Number : 149 Question Id : 6406531279489 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Concatenate the outputs from both the attention heads, then apply the output projection matrix W_o to produce the final output of the multi-head attention mechanism. Select the correct result of this operation.

Options :

6406534313829. ✗

$$\begin{bmatrix} 0.73 & 1.46 \\ 2.26 & 4.54 \\ 2.33 & 1.32 \\ 2.94 & 3.76 \end{bmatrix}$$

6406534313830. ✖ $\begin{bmatrix} 0.99 & 1.88 \\ 2.01 & 4.16 \\ 1.96 & 1.68 \\ 3.04 & 2.32 \end{bmatrix}$

6406534313831. ✖ $\begin{bmatrix} 0.00 & 0.00 \\ 0.50 & 0.50 \\ 2.65 & 2.60 \\ 2.58 & 2.32 \end{bmatrix}$

6406534313832. ✓ $\begin{bmatrix} 0.00 & 0.00 \\ 3.00 & 6.00 \\ 1.34 & 2.23 \\ 0.66 & 4.77 \end{bmatrix}$

Sub-Section Number :

6

Sub-Section Id :

640653201933

Question Shuffling Allowed :

No

Question Id : 6406531279490 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (150 to 152)

Question Label : Comprehension

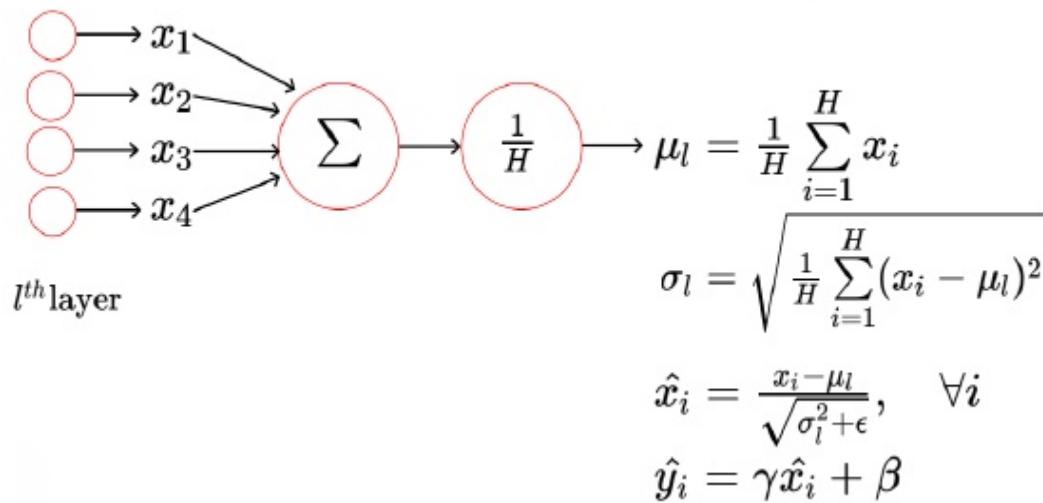
Apply “add and norm” layer to the output of the multihead attention in which :

- Input sequence (sequence length = 2, $d_{model} = 4$) to Multihead Attention:

$$X = \begin{bmatrix} 1 & 1 \\ 2 & 3 \\ 1 & 2 \\ 3 & 1 \end{bmatrix}$$

- Multi head Attention Output :

$$\text{MHA}(X) = \begin{bmatrix} 1 & 2 \\ 3 & 3 \\ 2 & 3 \\ 3 & 1 \end{bmatrix}$$



Based on the above data, answer the given subquestions.

Sub questions

Question Number : 150 Question Id : 6406531279491 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

For the given input matrix X and multihead attention output $\text{MHA}(X)$, apply a residual connection and store the result in matrix R , and finally compute the sum of all elements in matrix R .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

Question Number : 151 Question Id : 6406531279492 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

To apply the layer normalization on
the matrix R . How many learning
parameters (γ, β) will be required ?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

8

Question Number : 152 Question Id : 6406531279493 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Initialize $\gamma = 2 * \sigma_l$, $\beta = 1$ and use
 $\epsilon = 0$ and apply the layer
normalization on the matrix R and sum of
all the elements of the final output.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

8

Sub-Section Number :

7

Sub-Section Id :

640653201934

Question Shuffling Allowed :

No

Question Id : 6406531279494 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (153 to 155)

Question Label : Comprehension

The table presents the **conditional probability distribution** over vocabulary tokens at each timestep during sequence generation. Each **column** corresponds to a timestep (from 1 to 5), and the values represent the probability of selecting each token given the tokens chosen in all previous timesteps. For timestep t , the values in the column represent:

$$P(\text{token}_t \mid \text{token}_1, \text{token}_2, \dots, \text{token}_{t-1})$$

	timesteps				
	1	2	3	4	5
the	0.07	0.19	0.20	0.42	0.08
is	0.04	0.13	0.12	0.26	0.08
sky	0.23	0.12	0.35	0.05	0.15
today	0.03	0.18	0.16	0.16	0.46
very	0.22	0.01	0.07	0.11	0.15
blue	0.33	0.25	0.08	0.05	0.08

Table 1: Probability distribution over vocabulary tokens at each timestep

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 153 Question Id : 6406531279495 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

In exhaustive search, at timestep $t=1$, we run the decoder once to obtain probability distributions over all tokens in the vocabulary. Given the 6 tokens available in the table in the main question, how many times must we run the decoder at timestep $t=4$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

216

Question Number : 154 Question Id : 6406531279496 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

How many total sequences of exactly length 5 are possible according to exhaustive search?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

7776

Question Number : 155 Question Id : 6406531279497 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

If we use top-k sampling with k=2 at timestep 1, what is the normalized probability of selecting token "sky" at the timestep=1?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.41

DL(CV)

Section Id :	64065391702
Section Number :	9
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	32
Number of Questions to be attempted :	32
Section Marks :	79
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653201935
Question Shuffling Allowed :	No

Question Number : 156 Question Id : 6406531279498 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

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

6406534313839. ✓ YES

6406534313840. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 640653201936

Question Shuffling Allowed : Yes

Question Number : 157 Question Id : 6406531279499 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

What is the mean of transformed pixels after applying linear contrast stretching to the following 3x3 image?

$$\text{Image} = \begin{bmatrix} 52 & 55 & 61 \\ 59 & 79 & 61 \\ 76 & 61 & 64 \end{bmatrix}$$

Options :

6406534313841. ✓ 104.94

6406534313842. ✗ 100.25

6406534313843. ✗ 110.56

6406534313844. ✗ 98.78

Question Number : 158 Question Id : 6406531279500 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Which of the following statements is **false**?

Options :

- 6406534313845. ❌ Histogram equalization is a global operation.
- 6406534313846. ❌ Gaussian filtering is a local operation.
- 6406534313847. ❌ Convolution in the spatial domain corresponds to multiplication in the frequency domain.
- 6406534313848. ✓ Median filtering is a global operation.

Question Number : 159 Question Id : 6406531279501 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Which of the following statements is **True**?

Options :

- 6406534313849. ✓ Gaussian filter is a separable filter because it is linear.
- 6406534313850. ❌ Median filter is a non-separable filter.
- 6406534313851. ❌ Gaussian filter is a high-pass filter.
- 6406534313852. ❌ Mean filter is a non-separable filter because it is non-linear.

Question Number : 160 Question Id : 6406531279502 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Which of the following linear filters will leave the central value of the given matrix unchanged after convolution?

$$\begin{pmatrix} 12 & 15 & 14 \\ 9 & 8 & 7 \\ 5 & 6 & 4 \end{pmatrix}$$

Options :

6406534313853. ✓ $\frac{1}{7} \begin{pmatrix} 0 & 1 & 0 \\ 1 & 3 & 1 \\ 0 & 1 & 0 \end{pmatrix}$

6406534313854. ✗ $\frac{1}{9} \begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{pmatrix}$

6406534313855. ✗ $\frac{1}{5} \begin{pmatrix} 0 & 0 & 1 \\ 0 & 3 & 0 \\ 1 & 0 & 0 \end{pmatrix}$

6406534313856. ✗ $\frac{1}{4} \begin{pmatrix} 0 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 0 \end{pmatrix}$

Question Number : 161 Question Id : 6406531279503 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

A four-dimensional input vector $x = [2, -1, 0, 3]$ is passed to a hidden layer with a single neuron and an activation function $a(\cdot)$ to obtain z . Assume the corresponding weights are $[0.4, -0.6, 0.3, 0.9]$ and the bias is -0.1 . If the activation function $a(\cdot)$ is Sigmoid, Linear, Indicator, Softplus, ReLU, and Leaky-ReLU (with leak coefficient 0.01), what are the corresponding values of z ? (Note: Indicator function returns 1 for positive input, 0 otherwise; Softplus is defined as $\ln(1 + e^x)$).

Options :

6406534313857. ✓ 0.9820, 4.00, 1, 4.02, 4.00, 4.00

6406534313858. ✗ 0.8808, 3.50, 1, 3.54, 3.50, 3.50

6406534313859. ✗ 0.7311, 2.00, 1, 2.13, 2.00, 2.00

6406534313860. ✗ 0.5000, 0.00, 0, 0.69, 0.00, 0.00

Question Number : 162 Question Id : 6406531279504 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Identify the correct sequence of steps in a Canny edge detection pipeline. Steps are listed below:

1. Compute gradient magnitude and direction
2. Connect individual components
3. Smoothen the image
4. Threshold into strong, weak, or no edge
5. Gaussian Filter and Hysteresis
6. Non-maximum suppression
7. Apply derivative to get edges

Options :

6406534313861. ✗ 6 → 1 → 4 → 5 → 2

6406534313862. ✓ 3 → 1 → 6 → 4 → 2

6406534313863. ✗ 3 → 5 → 1 → 4 → 2

6406534313864. ✗ 6 → 1 → 5 → 7 → 2

Question Number : 163 Question Id : 6406531279505 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Identify the correct sequence of steps in Scale Invariant Feature Transform (SIFT) method.

Steps listed below:

1. Keypoint Descriptor
2. Keypoint Localization
3. Scale-space Extrema Detection
4. Orientation Estimation

Options :

6406534313865. ❌ 4 → 2 → 1 → 3

6406534313866. ✓ 3 → 2 → 4 → 1

6406534313867. ❌ 3 → 1 → 2 → 4

6406534313868. ❌ None of these.

Question Number : 164 Question Id : 6406531279506 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

During the double thresholding step in Canny edge detection, the high threshold is set at 100 and the low threshold is 40. A pixel gradient magnitude of 65 will be classified as:

Options :

6406534313869. ❌ Strong edge

6406534313870. ✓ Weak edge

6406534313871. ❌ Non-edge

6406534313872. ❌ Ambiguous edge

Question Number : 165 Question Id : 6406531279507 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Match the derivative of activation functions $f(x)$ with their counterparts on the right column accordingly.

- | | |
|---------------|---|
| 1) Leaky ReLU | i) $f(x)(1 - f(x))$ |
| 2) Tanh | ii) 0 if $x < 0$ and 1 if $x > 0$ |
| 3) ReLU | iii) $1 - f(x)^2$ |
| 4) Sigmoid | iv) 0.01 if $x < 0$ and 1 if $x > 0$ |
| | v) 0 if $x \geq 0$ and 1 if $x < 0$ |
| | vi) 0.01 if $x \geq 0$ and 1 if $x < 0$ |

Options :

6406534313873. ✘ 1 → vi, 2 → iii, 3 → v, 4 → i

6406534313874. ✘ 1 → i, 2 → iv, 3 → iii, 4 → ii

6406534313875. ✘ 1 → i, 2 → v, 3 → iii, 4 → iv

6406534313876. ✓ 1 → iv, 2 → iii, 3 → ii, 4 → i

Question Number : 166 Question Id : 6406531279508 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Consider a Convolutional Neural Network which processes an RGB image. It has 128 kernels each of spatial dimension 5×5 in the first layer. They are convolved with a stride 1. This is followed by a max-pooling layer with stride 2 and kernel size 5×5 . What would be the receptive field size of a single neuron in the pooling layer? (Recap: A receptive field is the size of the region in the input image, which influences the activation of that specific neuron.)

Options :

6406534313877. ✘ 5×5

6406534313878. ✘ 7×7

6406534313879. ✓ 9×9

6406534313880. ✘ 3×3

Question Number : 167 Question Id : 6406531279509 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Which of the following statements are True?

Options :

- 6406534313881. ❌ Vanilla Gradient Descent converges faster than Momentum-based GD.
- 6406534313882. ✓ Momentum based GD oscillates around minima before convergence.
- 6406534313883. ❌ Noise in Stochastic Gradient descent weight updates – can lead to faster convergence.
- 6406534313884. ❌ None of these

Question Number : 168 Question Id : 6406531279510 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

In the Gaussian smoothing step of the Canny edge detector, a Gaussian kernel of size 5×5 with standard deviation σ is used to reduce noise. If the standard deviation $\sigma = 1.0$, what is the approximate value of the center weight in the Gaussian kernel? (Use the formula for Gaussian kernel weight at the center:)

$$G(0,0) = \frac{1}{2\pi\sigma^2}$$

Options :

- 6406534313885. ✓ 0.16
- 6406534313886. ❌ 0.08
- 6406534313887. ❌ 0.20
- 6406534313888. ❌ 0.12

Question Number : 169 Question Id : 6406531279511 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Match the following:

- | | |
|----------------------------------|--------------------------------------|
| 1) Gaussian Filter | i) Edges found when gradient is low |
| 2) Sobel Filter | ii) Edges found at zero crossing |
| 3) First derivative of Gaussian | iii) Edge smoothing |
| 4) Second derivative of Gaussian | iv) Edge detection |
| | v) Edges found when gradient is high |

Options :

6406534313889. ✗ 1 → iii, 2 → iv, 3 → i, 4 → ii

6406534313890. ✗ 1 → iii, 2 → i, 3 → ii, 4 → v

6406534313891. ✓ 1 → iii, 2 → iv, 3 → v, 4 → ii

6406534313892. ✗ 1 → iv, 2 → iii, 3 → i, 4 → ii

Question Number : 170 Question Id : 6406531279512 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Match the Following:

- | | |
|-----------------------------|--|
| 1) Flat region in the image | i) No Change along the edge direction |
| 2) Edge pixel | ii) Significant change in all directions |
| 3) Corner pixel | iii) No Change in all directions |

Options :

6406534313893. ✓ 1 → iii, 2 → i, 3 → ii

6406534313894. ✗ 1 → iii, 2 → ii, 3 → i

6406534313895. ✗ 1 → ii, 2 → iii, 3 → ii

6406534313896. ✗ None of these.

Sub-Section Number :

3

Sub-Section Id :

640653201937

Question Shuffling Allowed :

Yes

Question Number : 171 Question Id : 6406531279513 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements are **true**? (Select all that apply)

Options :

tanh activation function can be expressed in terms of the sigmoid activation function as:

$$\tanh(x) = 2\sigma(2x) - 1,$$

6406534313897. ✓ where σ is the sigmoid activation function.

6406534313898. ✗ The derivative of the sigmoid activation function is symmetric around the origin.

6406534313899. ✗ The gradient of a sigmoid neuron at saturation tends to explode.

The sigmoid activation function is centered around 0.5, whereas the tanh activation function is

6406534313900. ✓ centered around 0.

Question Number : 172 Question Id : 6406531279514 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements are **true**? (Select all that apply)

Options :

To obtain an output of the same spatial size as the input after a convolution with kernel size

6406534313901. ✓ $k \times k$ (where k is odd) and stride 1, the padding used should be $\lceil \frac{k}{2} \rceil$.

The derivative of the loss L with respect to the input image X , where $Y = X * W$, is given by

6406534313902. ✓ $\frac{\partial L}{\partial X}[i, j] = \frac{\partial L}{\partial Y} \oplus W$, where $*$ denotes convolution and \oplus denotes correlation.

6406534313903. ✗ The number of learnable parameters in a pooling layer is not zero.

The number of feature maps obtained after a convolution operation depends on the depth of

6406534313904. ✗ the input but not on the number of filters.

Question Number : 173 Question Id : 6406531279515 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the following statements. Which of the following statements are true?

Options :

6406534313905. ✓ Convolution operator is both commutative and associative.

Fourier transform of a convolved image $\text{FT}(a * b)$ is not the product of the Fourier transforms

6406534313906. ✗ of the constituent images $\text{FT}(a) \times \text{FT}(b)$.

6406534313907. ✓ Convolution in the spatial domain corresponds to multiplication in the frequency domain.

The Fourier transform of a convolution is equal to the product of the individual Fourier trans-

6406534313908. ✗ forms only for linear, time-invariant systems.

6406534313909. ✓ Correlation and convolution are the same if one of the signals/images is symmetric.

6406534313910. ✓ The Fourier transform is a linear operator.

Question Number : 174 Question Id : 6406531279516 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Certain 2D kernel K can be decomposed into two 1D kernels (v and h) to reduce the computation cost such as $K = vh^\top$. The 2D kernel is called as Separable Kernel.

Consider the following 2D kernels

Which of the below kernels are separable?

Options :

$$\begin{bmatrix} 2 & 4 & 6 \\ 3 & 6 & 9 \\ 1 & 2 & 3 \end{bmatrix}$$

6406534313911. ✓

$$\begin{bmatrix} 2 & 4 & 6 \\ 3 & 6 & 9 \\ 2 & 3 & 4 \end{bmatrix}$$

6406534313912. ✗

$$\begin{bmatrix} 5 & 0 & 5 \\ 10 & 0 & 10 \\ -5 & 0 & 5 \end{bmatrix}$$

6406534313913. ✗

$$\begin{bmatrix} 5 & 0 & 5 \\ 10 & 0 & 10 \\ -5 & 0 & -5 \end{bmatrix}$$

6406534313914. ✓

Question Number : 175 Question Id : 6406531279517 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements are **false**?

Options :

6406534313915. ✗ Momentum in optimization can cause oscillations around minima when encountering flat regions or saddle points due to the dominance of the momentum term over the small gradient.

6406534313916. ✗ Stochastic Gradient Descent (SGD) with its inherent noise can be beneficial in escaping local minima and saddle points, provided that there is enough gradient information in the neighborhood.

6406534313917. ✓ Adagrad is an optimization algorithm introduced to overcome the diminishing learning rate problem in techniques like RMSProp.

6406534313918. ✓ ADAM is introduced to solve problems in RMSProp by combining RMSProp and Adagrad techniques.

Sub-Section Id :

640653201938

Question Shuffling Allowed :

Yes

Question Number : 176 Question Id : 6406531279518 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider the grayscale image shown below:

$$\begin{bmatrix} 12 & 18 & 22 & 25 & 30 \\ 20 & 15 & 17 & 21 & 23 \\ 25 & 19 & 20 & 24 & 28 \\ 27 & 22 & 23 & 18 & 20 \\ 30 & 24 & 21 & 19 & 25 \end{bmatrix}$$

If a median filter with a 3×3 neighborhood is applied to this image with a stride of 1 and no padding, _____ will be the value at position $(3,3)$ in the filtered image? (Assume that the top-left pixel coordinate of the output image is addressed as $(1,1)$.)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

20

Question Number : 177 Question Id : 6406531279519 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider the following discrete approximations of second derivative

$$\frac{\partial^2 f(x, y)}{\partial x^2} = -f(x+1, y) - f(x-1, y) + 2f(x, y)$$

$$\frac{\partial^2 f(x, y)}{\partial y^2} = -f(x, y+1) - f(x, y-1) + 2f(x, y)$$

The middle element of the Laplacian of the Gaussian (LoG) filter will be _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

4

Question Number : 178 Question Id : 6406531279520 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Given a 2×2 second moment matrix of edge pixels:

$$M = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$$

obtained during the Canny edge detection process, compute the measure of straightness defined as:

$$\text{Straightness} = \frac{\lambda_{\min} - \lambda_{\max}}{\lambda_{\max} + \lambda_{\min}}$$

where λ_{\max} and λ_{\min} are the maximum and minimum eigenvalues of M respectively.

The value of the straightness is _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

-2

Question Number : 179 Question Id : 6406531279530 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

In backpropagation through a convolutional layer, if the gradient of the loss with respect to the output feature map $\frac{\partial L}{\partial Y}$ is known, and the filter weights W have size 3×3 , stride 1, and no padding, what is the size of the gradient with respect to the input $\frac{\partial L}{\partial X}$ given that $\frac{\partial L}{\partial Y}$ has dimensions $26 \times 26 \times 5$?

Assume if the size of gradient is $F \times F \times d$, then give the value of F .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

28

Question Number : 180 Question Id : 6406531279531 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

What is the size of the feature map after applying two successive convolution operations with the following parameters? Input image size = 128×128 , Kernel size = 5×5 , Padding = 1, Stride = 4. (In calculation, take $\lfloor x \rfloor$ whenever x is non-integer. If the answer is $F \times F$, write only F in the blank.) _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

8

Question Number : 181 Question Id : 6406531279532 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Let an input to a convolutional layer in a CNN have size $D_f \times D_f \times M$, where $D_f = 28$ and $M = 120$. The output feature map after the convolution has size $D_f \times D_f \times N$, where $N = 80$. The kernel size of the convolution layer is $k \times k$, with $k = 3$.

Calculate the number of parameters for this convolution layer. (Assume appropriate padding is applied so that input and output spatial sizes remain the same. Ignore bias terms.) _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

86400

Question Number : 182 Question Id : 6406531279533 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Using momentum-based gradient descent, find the new value of the parameter θ_{t+1} , given that the old value $\theta_t = 0.5$, gradient of loss function $\nabla_{\theta_t} L(\theta_t) = 0.2$, velocity term $V_{t-1} = 0.7$, learning rate $\alpha = 0.75$ and momentum term $\gamma = 0.8$ (Round decimal point till 3 places) [Note: Assume that there is no bias]. _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

-0.260 to -0.210

Question Number : 183 Question Id : 6406531279534 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider the following numpy array

$$\text{arr} = \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$$

Now consider the following operations

```
copied_arr = arr.copy()
```

```
copied_arr[0, 0] = 100
```

Write the value of arr[0, 0]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

5

Question Number : 184 Question Id : 6406531279535 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider the following numpy array

$$\text{arr} = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

Now consider the following operations

```
viewed_arr = arr.view()
```

```
viewed_arr[0, 1] = 99
```

Write the value of arr[0, 1]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

99

Sub-Section Number : 5

Sub-Section Id : 640653201939

Question Shuffling Allowed : No

Question Id : 6406531279521 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (185 to 186)

Question Label : Comprehension

The gradient of an image I points in the direction of the most rapid change in intensity. Taking image derivatives accentuates (a) _____ frequencies and hence amplifies noise, since the proportion of noise to signal is larger at (b) _____ frequencies. The common solution is to smooth the image prior to computing gradients.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 185 Question Id : 6406531279522 Question Type : SA

Correct Marks : 1.5

Question Label : Short Answer Question

Enter the correct answer for Blank (a):

NOTE: Enter the exact answer without any extra space in the beginning or at the end.

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Set

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

high

higher

large

largest

Question Number : 186 Question Id : 6406531279523 Question Type : SA

Correct Marks : 1.5

Question Label : Short Answer Question

Enter the correct answer for Blank (b):

NOTE: Enter the exact answer without any extra space in the beginning or at the end.

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Set

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

high

higher

large

largest

Question Id : 6406531279524 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (187 to 188)

Question Label : Comprehension

In Canny edge detection, a large value of the Gaussian kernel spread σ leads to (a) _____ edges, while a small value of σ leads to (b) _____ edges.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 187 Question Id : 6406531279525 Question Type : SA

Correct Marks : 1.5

Question Label : Short Answer Question

Enter the correct answer for Blank (a) :

NOTE: Enter the exact answer without any extra space in the beginning or at the end.

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Set

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

thick

coarse

large-scale

Question Number : 188 Question Id : 6406531279526 Question Type : SA

Correct Marks : 1.5

Question Label : Short Answer Question

Enter the correct answer for Blank (b) :

NOTE: Enter the exact answer without any extra space in the beginning or at the end.

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Set

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

fine

thin

Question Id : 6406531279527 Question Type : COMPREHENSION Sub Question Shuffling

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

Question Numbers : (189 to 190)

Question Label : Comprehension

You have a visual codebook with 1500 visual words. From a test image, you extract 1200 SIFT descriptors, each of 128 dimensions. After assigning each descriptor to its nearest visual word, you compute the Bag-of-Words histogram by counting descriptor assignments.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 189 Question Id : 6406531279528 Question Type : SA

Correct Marks : 1.5

Question Label : Short Answer Question

What is the dimensionality of the Bag-of-Words (BoW) feature vector for this image?_____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1500

Question Number : 190 Question Id : 6406531279529 Question Type : SA

Correct Marks : 1.5

Question Label : Short Answer Question

If instead, you concatenate all the 1200 descriptors into a single vector (without using BoW), what will be the dimensionality of that vector?_____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

153600

Mathematical Foundations of Generative AI

Section Id :

64065391703

Section Number :

10

Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	19
Number of Questions to be attempted :	19
Section Marks :	50
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653201940
Question Shuffling Allowed :	No

Question Number : 191 Question Id : 6406531279536 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : MATHEMATICAL FOUNDATIONS OF GENERATIVE AI (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 :

6406534313934. ✓ YES

6406534313935. ✗ NO

Sub-Section Number :	2
Sub-Section Id :	640653201941
Question Shuffling Allowed :	Yes

Question Number : 192 Question Id : 6406531279537 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Suppose in GAN, the supports of p_{data} and p_g are disjoint. What is the value of the GAN value function (adversarial loss)?

Options :

6406534313936. ✘ 1

6406534313937. ✘ $-\infty$

6406534313938. ✓ 0

6406534313939. ✘ $\log 2$

Question Number : 193 Question Id : 6406531279538 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Consider in GAN, a simple setting where $p_{\text{data}} = \delta(x-1)$ and $p_g = \delta(x+1)$, i.e., both are Dirac delta functions located at different points. What is the GAN value function $V(G)$ (adversarial loss)?

Dirac delta function is defined as

$$\delta(x) = \begin{cases} 0, & x \neq 0 \\ \infty, & x = 0 \end{cases}$$

which satisfies

$$\int_{-\infty}^{\infty} \delta(x) dx = 1.$$

Options :

6406534313940. ✘ $-\log 2$

6406534313941. ✓ 0

6406534313942. ✘ $-\log(0.5)$

6406534313943. ✘ $\log 4$

Question Number : 194 Question Id : 6406531279539 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Consider the following GAN training loop in PyTorch:

```
for _ in range(k):
    optimizer_D.zero_grad()
    loss_D.backward()
    optimizer_D.step()
    optimizer_G.zero_grad()
    loss_G.backward()
    optimizer_G.step()
```

Where K is an integer.

What does this loop imply?

Options :

- 6406534313944. ❌ Generator is updated multiple times per discriminator update.
- 6406534313945. ✓ Discriminator is updated multiple times per generator update.
- 6406534313946. ❌ Both networks are updated simultaneously.
- 6406534313947. ❌ The model uses gradient accumulation.

Question Number : 195 Question Id : 6406531279540 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Suppose you are training a GAN using `torch.nn.BCELoss()`. During training, the discriminator loss becomes nearly zero and the generator loss increases rapidly. What is the most likely explanation?

Options :

- 6406534313948. ❌ The generator is overfitting to the noise.
- 6406534313949. ✓ The discriminator has become too strong.
- 6406534313950. ❌ The learning rate of the generator is too high.
- 6406534313951. ❌ The noise vector dimension is too large.

Question Number : 196 Question Id : 6406531279541 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

In Bi-GAN, which of the following expressions represents the correct joint objective to be minimized by the encoder E and generator G , and maximized by the discriminator D ?

Options :

6406534313952. ✓ $\mathbb{E}_{x \sim p_{\text{data}}(x)}[\log D(x, E(x))] + \mathbb{E}_{z \sim p_z(z)}[\log(1 - D(G(z), z))]$

6406534313953. ✗ $\mathbb{E}_{z \sim p_z(z)}[\log D(G(z), z)] + \mathbb{E}_{x \sim p_{\text{data}}(x)}[\log(1 - D(x, E(x)))]$

6406534313954. ✗ $\mathbb{E}_{x \sim p_{\text{data}}(x)}[\log(1 - D(x, E(x)))] + \mathbb{E}_{z \sim p_z(z)}[\log(1 - D(G(z), z))]$

6406534313955. ✗ $\mathbb{E}_{x \sim p_{\text{data}}(x)}[\log D(x)] + \mathbb{E}_{z \sim p_z(z)}[\log(1 - D(G(z)))]$

Question Number : 197 Question Id : 6406531279542 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Assume that the encoder E in a Bi-GAN maps $x \in \mathbb{R}^{784}$ to $z \in \mathbb{R}^{100}$, and G maps z to x . What is a necessary condition for E and G to become inverses of each other?

Options :

6406534313956. ✗ D must be able to distinguish between fake and real with high confidence.

6406534313957. ✓ The composite mapping $G(E(x)) \approx x$ and $E(G(z)) \approx z$ must hold for all x and z .

6406534313958. ✗ The generator and encoder must share weights.

6406534313959. ✗ The discriminator must estimate pixel-wise binary mask loss.

Question Number : 198 Question Id : 6406531279543 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Let p_r and p_g be two probability distributions supported on a compact metric space \mathcal{X} . The Wasserstein-1 distance is defined as:

$$W(p_r, p_g) = \inf_{\gamma \in \Pi(p_r, p_g)} \mathbb{E}_{(x,y) \sim \gamma} [\|x - y\|_2]$$

Which of the following properties is guaranteed for W , unlike the Jensen-Shannon divergence?

Options :

6406534313960. ✓ It is finite and continuous even when p_r and p_g have disjoint supports.
6406534313961. ✗ It is always zero for disjoint supports.
6406534313962. ✗ It upper bounds the KL divergence.
6406534313963. ✗ It requires the same dimensionality of supports.

Question Number : 199 Question Id : 6406531279544 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

In W-GAN, enforcing the 1-Lipschitz condition on the critic (discriminator) is crucial. Which of the following methods **fails** to properly enforce the Lipschitz constraint?

Options :

6406534313964. ✓ Weight clipping, lead to capacity underuse and gradient vanishing.
6406534313965. ✗ Gradient penalty via $\lambda \mathbb{E}_{\hat{x}} [(\|\nabla_{\hat{x}} D(\hat{x})\|_2 - 1)^2]$.
6406534313966. ✗ Spectral normalization to bound each layer's Lipschitz constant.
6406534313967. ✗ Enforcing $\|f(x_1) - f(x_2)\| \leq \|x_1 - x_2\|$ directly via constraint optimization.

Question Number : 200 Question Id : 6406531279548 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

If a domain classifier achieves 100% accuracy in distinguishing between source and target domain samples, what can we say about domain adaptation?

Options :

6406534313980. ✘ The domains are perfectly aligned

6406534313981. ✘ The classifier is overfitting

6406534313982. ✓ The domains are misaligned

6406534313983. ✘ Nothing can be inferred

Question Number : 201 Question Id : 6406531279550 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

If the Inception network produces activations with mean and covariance for real data as μ_r , Σ_r and for generated data as μ_g , Σ_g , which of the following is true?

Options :

6406534313988. ✘ If $\mu_r = \mu_g$ and $\Sigma_r = \Sigma_g$, FID is negative.

6406534313989. ✓ FID is non-negative and equals 0 when distributions are identical.

6406534313990. ✘ FID can be undefined if Σ_r is not positive definite.

6406534313991. ✘ FID equals the KL divergence between the distributions.

Sub-Section Number :

3

Sub-Section Id :

640653201942

Question Shuffling Allowed :

Yes

Question Number : 202 Question Id : 6406531279545 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

In the PyTorch implementation of W-GAN, which of the following code snippets correctly enforces the weight clipping constraint on the critic?

Options :

6406534313968. ❌

```
for p in D.parameters():
    p = torch.clamp(p, -0.01, 0.01)
```

6406534313969. ✓

```
for p in D.parameters():
    p.data.clamp_(-0.01, 0.01)
```

6406534313970. ❌

```
torch.nn.utils.clip_grad_norm_(D.parameters(), 0.01)
```

6406534313971. ❌

```
D.clip(-0.01, 0.01)
```

Question Number : 203 Question Id : 6406531279549 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

In adversarial domain adaptation, a gradient reversal layer is used with a coefficient $\lambda = 0.5$. If the original gradient is $\nabla = [2, -4]$, what is the reversed gradient used to update the feature extractor?

Options :

6406534313984. ✓ [-1, 2]

6406534313985. ❌ [1, -2]

6406534313986. ❌ [-2, 4]

6406534313987. ❌ [0, 0]

Sub-Section Number : 4

Sub-Section Id : 640653201943

Question Shuffling Allowed : Yes

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the following marginal distributions:

$$P = [0.25, 0.25, 0.5], \quad Q = [0.5, 0.3, 0.2]$$

Which of the following transport plans T is valid (i.e., has row sums = P and column sums = Q)?

Options :

6406534313972. ✘ $\begin{bmatrix} 0.25 & 0 & 0 \\ 0.25 & 0 & 0 \\ 0 & 0.3 & 0.2 \end{bmatrix}$

6406534313973. ✓ $\begin{bmatrix} 0.2 & 0.05 & 0 \\ 0.3 & 0 & 0 \\ 0 & 0.25 & 0.25 \end{bmatrix}$

6406534313974. ✘ $\begin{bmatrix} 0.1 & 0.1 & 0.05 \\ 0.2 & 0.2 & 0.1 \\ 0.2 & 0 & 0.1 \end{bmatrix}$

6406534313975. ✘ $\begin{bmatrix} 0.3 & 0 & 0 \\ 0.2 & 0.2 & 0.2 \\ 0 & 0.1 & 0.3 \end{bmatrix}$

Question Number : 205 Question Id : 6406531279547 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Let $P = [0.2, 0.3, 0.5]$ and $Q = [0.3, 0.3, 0.4]$. Consider the following transport plan matrix T :

$$T = \begin{bmatrix} 0.2 & 0.0 & 0.0 \\ 0.1 & 0.2 & 0.0 \\ 0.0 & 0.1 & 0.4 \end{bmatrix}$$

and cost matrix

$$D = \begin{bmatrix} 0 & 1 & 3 \\ 1 & 0 & 2 \\ 3 & 2 & 0 \end{bmatrix}$$

Compute the total cost (EMD).

Options :

6406534313976. ✘ 1.1

6406534313977. ✘ 1.5

6406534313978. ✘ 0.8

6406534313979. ✓ 0.9

Sub-Section Number :

5

Sub-Section Id :

640653201944

Question Shuffling Allowed :

Yes

Question Number : 206 Question Id : 6406531279551 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Given two multivariate Gaussians with means μ_r , μ_g and covariances Σ_r , Σ_g , the Frechet Inception Distance (FID) is defined as:

$$\text{FID} = \|\mu_r - \mu_g\|^2 + \text{Tr} \left(\Sigma_r + \Sigma_g - 2(\Sigma_r \Sigma_g)^{1/2} \right)$$

Suppose:

$$\mu_r = [1, 1], \quad \mu_g = [2, 3], \quad \Sigma_r = I, \quad \Sigma_g = 4I$$

What is the FID?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

6

Sub-Section Number :

6

Sub-Section Id :

640653201945

Question Shuffling Allowed :

Yes

Question Number : 207 Question Id : 6406531279552 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Given two discrete distributions:

$$P = [0.5, 0.5], \quad Q = [0.25, 0.75]$$

and an f -divergence defined using $f(u) = u \log u$ (i.e., Kullback-Leibler divergence), compute $D_f(P\|Q)$. Enter the answer correct to two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.13

Question Number : 208 Question Id : 6406531279553 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Let $P = [0.1, 0.2, 0.7]$ and $Q = [0.2, 0.3, 0.5]$. Approximate the total variation distance $D_{TV}(P, Q) = \frac{1}{2} \sum_i |p_i - q_i|$. Enter the answer correct to two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.2

Sub-Section Number :

7

Sub-Section Id :

640653201946

Question Shuffling Allowed :

No

Question Id : 6406531279554 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (209 to 211)

Question Label : Comprehension

A GAN's generator $G(z)$ takes in a latent vector $z \sim \mathcal{N}(0, I)$ of size 100, and produces images of shape 28×28 .

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 209 Question Id : 6406531279555 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

If the generator consists of three linear layers: $100 \rightarrow 128 \rightarrow 256 \rightarrow 784$, how many trainable parameters are in the generator (excluding biases)?

Options :

6406534313995. ✘ 78,400

6406534313996. ✘ 102,400

6406534313997. ✓ 246,272

6406534313998. ✘ 156,000

Question Number : 210 Question Id : 6406531279556 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

During Bi-GAN training, suppose you compute discriminator output on:

$$D(x, E(x)) = 0.85, \quad D(G(z), z) = 0.15$$

If using Binary Cross Entropy loss with target labels 1 for real and 0 for fake, what is the total discriminator loss?

Options :

6406534313999. ✓ 0.324

6406534314000. ✘ 0.45

6406534314001. ✘ 0.23

6406534314002. ✘ 0.85

Question Number : 211 Question Id : 6406531279557 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

In a Bi-GAN, you use an encoder E , generator G , and discriminator D . Given batch size 64, and each sample is 784-dimensional, what is the shape of the input to the discriminator?

Options :

6406534314003. ✘ [64, 784]

6406534314004. ✘ [64, 100]

6406534314005. ✓ [64, 884]

6406534314006. ✘ [128, 784]

DLP

Section Id :	64065391704
Section Number :	11
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	13
Number of Questions to be attempted :	13
Section Marks :	50
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653201947
Question Shuffling Allowed :	No

Question Number : 212 Question Id : 6406531279558 Question Type : MCQ**Correct Marks : 0**

Question Label : Multiple Choice Question

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

6406534314007. ✓ YES

6406534314008. ✘ NO

Sub-Section Number :	2
Sub-Section Id :	640653201948
Question Shuffling Allowed :	Yes

Question Number : 213 Question Id : 6406531279559 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

A start-up is building a new language model for a low-resource language with many compound words and complex morphology. They are debating tokenization strategies. Which of the following approaches is most likely to offer the best balance between vocabulary size, handling OOV words, and capturing morphological variants effectively for this scenario?

Options :

6406534314009. ❌ Character-level tokenization

6406534314010. ❌ Word-level tokenization with a fixed vocabulary of 50,000 common words.

6406534314011. ✓ Subword tokenization (e.g., BPE or SentencePiece) trained on the available corpus.

6406534314012. ❌ Using only pre-defined special tokens and treating all other text as raw byte sequences.

Question Number : 214 Question Id : 6406531279561 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

When fully fine-tuning a large pre-trained Transformer model (e.g., >1 Billion parameters), which of the following contributes LEAST significantly to the GPU memory bottleneck compared to the others?

Options :

6406534314017. ❌ Storing the model parameters themselves.

6406534314018. ❌ Storing the gradients for each parameter.

6406534314019. ❌ Storing the optimizer states (e.g., momentum and variance for Adam).

6406534314020. ✓ Storing the input batch data (token IDs).

Question Number : 215 Question Id : 6406531279562 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

A research team wants their pre-trained language model to generate more helpful and harmless responses without extensive task-specific dataset collection. They have a collection of prompts and human-preferred responses. Which of the following techniques directly aligns with this goal and data?

Options :

- 6406534314021. ✘ Pre-training the model on a larger, more diverse text corpus.
- 6406534314022. ✘ Full fine-tuning on multiple downstream classification tasks.
- 6406534314023. ✓ Instruction Tuning using prompt-completion pairs or reformatting existing datasets into an instructional format.
- 6406534314024. ✘ Implementing Parameter-Efficient Fine-Tuning (PEFT) techniques like LoRa.

Sub-Section Number : 3

Sub-Section Id : 640653201949

Question Shuffling Allowed : Yes

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following Python code snippet using Hugging Face tokenizers:

```
from tokenizers import Tokenizer
from tokenizers.models import BPE
from tokenizers.pre_tokenizers import Whitespace
from tokenizers.normalizers import Lowercase
from tokenizers.processors import TemplateProcessing

tokenizer = Tokenizer(BPE(unk_token="[UNK]"))
tokenizer.normalizer = Lowercase()
tokenizer.pre_tokenizer = Whitespace()

tokenizer.post_processor = TemplateProcessing(
    single="[CLS] $A [SEP]",
    pair="[CLS] $A [SEP] $B:1 [SEP]:1",
    special_tokens=[("[CLS]", tokenizer.token_to_id("[CLS]")),
                   ("[SEP]", tokenizer.token_to_id("[SEP]"))],
)
encoded_output = tokenizer.encode("Hello World")
```

Which of the following attributes would be present in the `encoded_output` object and directly reflect the action of the `TemplateProcessing` post-processor for a single sequence as configured?

Options :

6406534314013. ✘ `overflowing_tokens`

6406534314014. ✘ `token_type_ids` (e.g., a list of all 0s)

6406534314015. ✘ `word_ids`

The `ids` list will start with the ID for `[CLS]`, followed by token IDs for "hello world", and end with the ID for `[SEP]`.
6406534314016. ✓

Question Number : 217 Question Id : 6406531279563 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following Python code snippet:

```
from datasets import Dataset

data = {"text": ["example one", "example two"]}
dataset = Dataset.from_dict(data)

def add_length(example):
    example["length"] = len(example["text"].split())
    return example

dataset = dataset.map(add_length)
```

After executing the code above, what will `dataset.column_names` return?

Options :

6406534314025. ✘ ['text']

6406534314026. ✘ ['length']

6406534314027. ✓ ['text', 'length']

6406534314028. ✘ The code will raise an error because the dictionary structure is incorrect for `map`.

Sub-Section Number :

4

Sub-Section Id :

640653201950

Question Shuffling Allowed :

Yes

Question Number : 218 Question Id : 6406531279564 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements accurately describe common characteristics or goals of subword tokenization algorithms like BPE, WordPiece, or SentencePiece? (Select ALL that apply)

Options :

6406534314029. ❌ They aim to significantly reduce the vocabulary size compared to character-level tokenization.

6406534314030. ✓ They can handle out-of-vocabulary (OOV) words by breaking them into known subword units.

6406534314031. ❌ They primarily rely on merging the least frequent character or subword pairs to build the vocabulary.

6406534314032. ✓ They can represent common words as single tokens and rare words as sequences of subword tokens.

6406534314033. ✓ SentencePiece is designed to be language-agnostic, not requiring pre-segmentation based on spaces.

Question Number : 219 Question Id : 6406531279565 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

A team has a powerful pre-trained language model (e.g., a GPT-3 class model). They want to adapt it for a new summarization task but have very limited labeled summarization data and limited compute for full fine-tuning. Which of the following strategies could be viable and effective? (Select ALL that apply)

Options :

6406534314034. ❌ Zero-shot prompting by providing the text and an instruction like "Summarize this:".

6406534314035. ✓ Few-shot prompting (in-context learning) by providing a few examples of text and their summaries in the prompt before the target text.

6406534314036. ❌ Full supervised fine-tuning of all model parameters on the small labeled dataset.

6406534314037. ✓ Using a Parameter-Efficient Fine-Tuning (PEFT) method like LoRA on the small labeled dataset.

6406534314038. ✓ Collecting a much larger unlabeled corpus related to the summarization domain and continuing pre-training.

Question Number : 220 Question Id : 6406531279566 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

You are using the Hugging Face Trainer class to fine-tune a language model. Which of the following arguments, when passed to `TrainingArguments`, would directly influence how often the model's state (weights) is saved during training? (Select ALL that apply)

Options :

6406534314039. ✘ `evaluation_strategy="steps"`

6406534314040. ✓ `save_strategy="epoch"`

6406534314041. ✘ `learning_rate=5e-5`

6406534314042. ✓ `save_steps=500`

6406534314043. ✘ `load_best_model_at_end=True`

Sub-Section Number :

5

Sub-Section Id :

640653201951

Question Shuffling Allowed :

Yes

Question Number : 221 Question Id : 6406531279567 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

You start with an initial vocabulary consisting only of individual characters: {"a":10, "b":8, "c":5, "</w>":15}. Your corpus, after pre-tokenization and adding </w>, is:

a b c </w> (5 times)

a b </w> (3 times)

a a c </w> (2 times)

If you perform exactly one merge operation using the Byte Pair Encoding (BPE) algorithm (merging the most frequent adjacent pair), what will be the new size of your vocabulary (including initial characters and the newly merged token)?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

5

Question Number : 222 Question Id : 6406531279569 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider the following Python code snippet:

```
from datasets import Dataset

data = {
    "text": ["short one", "a very long sentence indeed", "medium example three", "tiny"],
    "label": [0, 1, 0, 1]
}
dataset = Dataset.from_dict(data)

filtered_dataset = dataset.filter(lambda x: len(x['text'].split()) > 2)
```

How many samples will filtered_dataset contain after executing the code?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

2

Sub-Section Number :	6
Sub-Section Id :	640653201952
Question Shuffling Allowed :	Yes

Question Number : 223 Question Id : 6406531279568 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

In the GPT-1 model, the embedding dimension (d_{model}) is 768, and the FFN hidden layer size is 3072. The FFN consists of one linear layer projecting from d_{model} to the hidden size, an activation function (GELU), and another linear layer projecting from the hidden size back to d_{model} . Calculate the total number of parameters (weights + biases) in a single FFN block, in millions. Enter your answer rounded to one decimal place (e.g., 5.2).

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

4.6 to 4.8

Sub-Section Number :	7
Sub-Section Id :	640653201953
Question Shuffling Allowed :	No

Question Id : 6406531279570 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (224 to 228)

Question Label : Comprehension

Consider the following model configuration:

Causal Language Model, embedding_dimension (d_model): 1024, num_transformer_blocks: 24, vocab_size: 32,000, num_attention_heads: 16.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 224 Question Id : 6406531279571 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Given the comprehension passage details, if you were to initialize this model using Hugging Face `transformers`, which line of code would be most appropriate for defining the model configuration object?

Options :

config = BertConfig(vocab_size=32000, hidden_size=1024, num_hidden_layers=24,
6406534314047. ❌ num_attention_heads=16)

6406534314048. ✓ config = GPT2Config(vocab_size=32000, n_embd=1024, n_layer=24, n_head=16)

6406534314049. ❌ config = T5Config(vocab_size=32000, d_model=1024, num_layers=24, num_attention_heads=16)

6406534314050. ❌ config = AutoConfig.from_pretrained("some_encoder_decoder_model", vocab_size=32000, hidden_size=1024)

Question Number : 225 Question Id : 6406531279572 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

Based on the provided configuration, calculate the total number of parameters in the model's embedding layer (token embeddings) in millions. Enter your answer rounded to one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

32.7 to 32.9

Question Number : 226 Question Id : 6406531279573 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Based on the provided configuration, what is a primary characteristic of this language model's architecture and training paradigm?

Options :

6406534314052. ❌ It's an encoder-decoder model designed for sequence-to-sequence tasks like translation.

6406534314053. ❌ It's an encoder-only model, likely using Masked Language Modeling for pre-training.

6406534314054. ✓ It's a decoder-only model, pre-trained using a Causal Language Modeling objective.

6406534314055. ❌ It's a small model primarily intended for edge devices due to its limited context length.

Question Number : 227 Question Id : 6406531279574 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

Considering the Adam optimizer stores 2 floating-point values per model parameter and parameters are 32-bit floats (4 bytes), if the total number of trainable parameters in the model is exactly 350 Million, how much GPU memory (in Gigabytes, GB) would be required just for the optimizer states? (Assume 1 GB = 10^9 bytes). Enter your answer rounded to one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

2.7 to 2.9

Question Number : 228 Question Id : 6406531279575 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

The configuration states the model uses Byte Pair Encoding (BPE). What is a key implication of this choice for handling text from diverse sources during inference?

Options :

6406534314057. ❌ The model will be unable to process any words not seen during BPE vocabulary training, leading to frequent errors.

6406534314058. ❌ All input words will be tokenized into individual characters, increasing sequence length significantly.

6406534314059. ✓ Out-of-vocabulary words can be represented as sequences of known subword units, allowing the model to process them.

6406534314060. ❌ BPE ensures that every language will have roughly the same number of tokens for a text of similar semantic content.

Statistical Computing

Section Id :	64065391705
Section Number :	12
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	10
Section Marks :	30
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653201954
Question Shuffling Allowed :	No

Question Number : 229 Question Id : 6406531279576 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : STATISTICAL COMPUTING (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 :

6406534314061. ✓ YES

6406534314062. ✘ NO

Correct Marks : 0**Question Label : Multiple Choice Question**

Use the following PDFs and PMFs if required:

- $X \sim \text{Bernoulli}(p)$, $\Pr(X = k) = p^k(1 - p)^{1-k}$, for $k \in \{0, 1\}$.
- $X \sim \text{Binomial}(n, p)$, $\Pr(X = k) = \binom{n}{k} p^k (1 - p)^{n-k}$, for $k = 1, \dots, n$
- $X \sim \text{Geometric}(p)$, $\Pr(X = k) = (1 - p)^{k-1} p$, for $k = 1, 2, 3, \dots$
- $X \sim \text{Geometric}(p)$, $\Pr(X = k) = (1 - p)^k p$, for $k = 0, 1, 2, \dots$
- $X \sim \text{Negative binomial}(r, p)$, $\Pr(X = k) = \binom{k+r-1}{k} (1 - p)^k p^r$, for $r > 0$ and $k = 0, 1, 2, \dots$
- $X \sim \text{Uniform}\{1, 2, \dots, n\}$, $\Pr(X = k) = \frac{1}{n}$, for $k \in \{1, 2, \dots, n\}$
- $X \sim \text{Poisson}(\lambda)$, $\Pr(X = k) = \frac{e^{-\lambda} \lambda^k}{k!}$, for $k = 0, 1, 2, \dots$
- $X \sim \text{Uniform}[a, b]$, $f_X(x) = \frac{1}{b-a}$, 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 $-\infty < x < \infty$
- $X \sim \text{Gamma}(\alpha, \beta)$, $f_X(x) = \frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}$, for $x > 0$ and $\alpha, \beta > 0$.
- $X \sim \text{Beta}(\alpha, \beta)$, $f_X(x) = \frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1} (1-x)^{\beta-1}$, for $0 < x < 1$ and $\alpha, \beta > 0$.
- $X \sim \text{Cauchy}(\mu, \lambda)$, $f_X(x) = \frac{1}{\pi\lambda} \left[\frac{1}{1 + \left(\frac{x-\mu}{\lambda}\right)^2} \right]$, for $x \in \mathbb{R}$ and $\lambda > 0, \mu \in \mathbb{R}$
- $X \sim \chi_k^2$, $f_X(x) = \frac{x^{k/2-1} e^{-x/2}}{2^{k/2} \Gamma(k/2)}$, for $x \geq 0$ and $k = 1, 2, \dots$
- $X \sim t_k$, $f_X(x) = \frac{\Gamma[(k+1)/2]}{\Gamma(k/2)\sqrt{\pi k}} \left(1 + \frac{x^2}{k}\right)^{-(k+1)/2}$, for $-\infty < x < \infty$ and $k = 1, 2, \dots$

Options :

6406534314063. ✓ Useful Data has been mentioned above.

6406534314064. ❌ This data attachment is just for a reference & not for an evaluation.

Sub-Section Number :

2

Sub-Section Id :

640653201955

Question Shuffling Allowed :

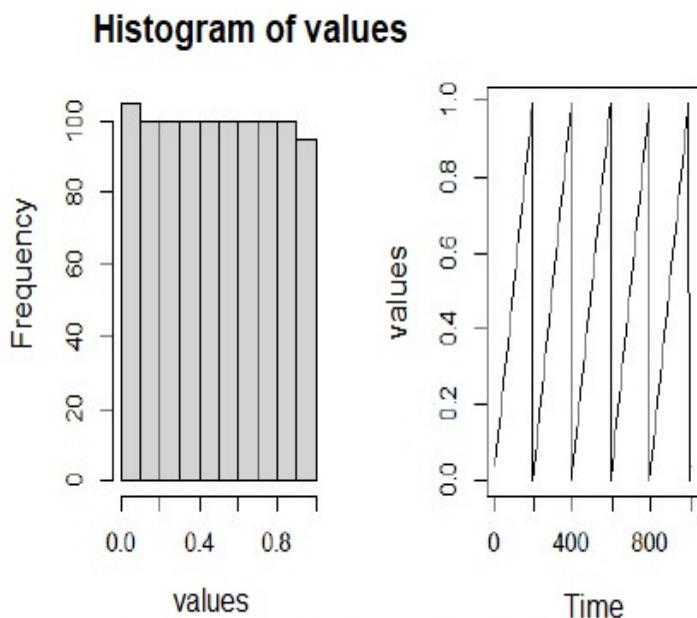
Yes

Question Number : 231 Question Id : 6406531279578 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Consider the following histogram and trace plot of 1000 randomly generated values using “Mixed Congruential Method”:



Choose the correct options from the following.

Options :

6406534314065. ❌ We consider these values as i.i.d $U(0, 1)$ because the histogram shows an almost perfect uniform distribution.

6406534314066. ✓ The trace plot shows that the generated random values are not independent.

6406534314067. ❌ The trace plot shows that the generated random values are independent.

6406534314068. ❌ We consider these values as i.i.d. $U(0, 1)$ because the trace plot shows a random pattern.

Sub-Section Number :

3

Sub-Section Id :

640653201956

Question Shuffling Allowed :

Yes

Question Number : 232 Question Id : 6406531279579 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

For $h : \mathcal{X} \rightarrow \mathbb{R}$, suppose we want to estimate $\theta = E_F[h(X)]$, where the support of F is \mathcal{X} . Let G be a distribution with density g defined on \mathcal{X} . If $Z_1, Z_2, \dots, Z_n \stackrel{\text{i.i.d.}}{\sim} G$ and an estimator of θ is defined as

$$\hat{\theta}_g = \frac{1}{n} \sum_{t=1}^n h(Z_t)w(Z_t),$$

select the correct option(s) from the following.

Options :

6406534314069. ✘ $\hat{\theta}_g$ is the importance sampling estimator with weight $w(Z_t) = \frac{g(Z_t)}{f(Z_t)}$.

6406534314070. ✓ G is called the importance distribution.

6406534314071. ✓ The importance sampling estimator $\hat{\theta}_g$ is unbiased for θ .

6406534314072. ✘ The importance sampling estimator $\hat{\theta}_g$ is not consistent for θ .

Sub-Section Number : 4

Sub-Section Id : 640653201957

Question Shuffling Allowed : Yes

Question Number : 233 Question Id : 6406531279580 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which among the following statements are true for the ratio-of-uniform method when the box $[0, a] \times [b, c]$ is used to enclose the set C ?

Options :

If the box enclosing the set C is large, the algorithm takes more number of iterations 6406534314073. ✓ for one acceptance.

If the box enclosing the set C is large, the algorithm takes lesser number of 6406534314074. ✗ iterations for one acceptance.

6406534314075. ✓ The probability of acceptance is $\frac{1}{2a(c-b)}$.

6406534314076. ✗ The probability of acceptance is $1/c$.

Sub-Section Number :

5

Sub-Section Id :

640653201958

Question Shuffling Allowed :

Yes

Question Number : 234 Question Id : 6406531279581 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

Suppose we want to generate random samples from $\text{Normal}(0, 1)$ by using the accept reject method with Laplace as a proposal distribution whose pdf is

$$g(x) = \frac{1}{2b} \exp\left(-\frac{|x|}{b}\right), \quad b > 0, x \in \mathbb{R}.$$

Find the optimal value of b .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Sub-Section Number :

6

Sub-Section Id :

640653201959

Question Shuffling Allowed :

No

Question Id : 6406531279582 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (235 to 237)

Question Label : Comprehension

Suppose we want to obtain samples from a distribution with pdf

$$f(x) = 6x(1 - x), \quad \text{where } 0 < x < 1$$

by using the accept-reject method with the following proposal distributions:

- $U[0, 2]$
- $U[0, 1]$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 235 Question Id : 6406531279583 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Find the probability of acceptance for $U[0, 2]$ as a proposal distribution. 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 :

0.30 to 0.36

Question Number : 236 Question Id : 6406531279584 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Find the expected number of loops for an acceptance when $U[0, 1]$ is considered as a proposal distribution. 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 : 237 Question Id : 6406531279585 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Which proposal distribution would be a better choice?

Options :

- 6406534314080. ❌ $U [0, 1]$ is better since it gives a larger value of c than $U [0, 2]$.
- 6406534314081. ❌ $U [0, 2]$ is better since it gives a smaller value of c than $U [0, 1]$.
- 6406534314082. ✓ $U [0, 1]$ is better since it gives a smaller value of c than $U [0, 2]$.
- 6406534314083. ❌ Both proposal distributions are equally effective.

Sub-Section Number :

7

Sub-Section Id :

640653201960

Question Shuffling Allowed :

No

Question Id : 6406531279586 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (238 to 239)

Question Label : Comprehension

Suppose we want to generate random samples from a distribution whose CDF is a mixture of two CDFs as follows:

$$F(x) = \frac{1}{2} \cdot F_1(x) + \frac{1}{2} \cdot F_2(x)$$

where,

$$F_1(x) = \begin{cases} 0, & x < 0 \\ x, & 0 \leq x \leq 1 \\ 1, & x > 1 \end{cases}$$

$$F_2(x) = \begin{cases} 0, & x < 1 \\ x - 1, & 1 \leq x \leq 2 \\ 1, & x > 2 \end{cases}$$

Based on the given information, answer the sub-questions:

Sub questions

Question Number : 238 Question Id : 6406531279587 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

What will be the distribution function of X ?

Options :

$$F(x) = \begin{cases} 0, & x < 0 \\ \frac{x}{2}, & 0 \leq x \leq 2 \\ 1, & x > 2 \end{cases}$$

6406534314084. ❌

$$F(x) = \begin{cases} 0, & x < 0 \\ \frac{x}{2}, & 0 \leq x < 1 \\ \frac{1}{2} + \frac{x-1}{2}, & 1 \leq x \leq 2 \\ 1, & x > 2 \end{cases}$$

6406534314085. ✓

$$F(x) = \begin{cases} 0, & x < 0 \\ \frac{x^2}{2}, & 0 \leq x \leq 1 \\ \frac{1}{2} + \frac{x-1}{2}, & 1 \leq x \leq 2 \\ 1, & x > 2 \end{cases}$$

6406534314086. ❌

Correct Marks : 2

Question Label : Multiple Choice Question

Use inverse transform method to draw samples from F .

- Step 1: Generate $U \sim U[0, 1]$.

Which among the following is step 2?

Options :

6406534314087. ✘ Set $X = \begin{cases} 2U, & \text{for } 0 \leq U < 0.5 \\ 2U + 1, & \text{for } 0.5 \leq U \leq 1 \end{cases}$

6406534314088. ✓ Set $X = \begin{cases} 2U, & \text{for } 0 \leq U < 0.5 \\ 2U, & \text{for } 0.5 \leq U \leq 1 \end{cases}$

6406534314089. ✘ Set $X = \begin{cases} 2U, & \text{for } 0 \leq U < 0.5 \\ 2U - 1, & \text{for } 0.5 \leq U \leq 1 \end{cases}$

6406534314090. ✘ Set $X = \begin{cases} 2U, & \text{for } 0 \leq U < 0.5 \\ 1 - 2U, & \text{for } 0.5 \leq U \leq 1 \end{cases}$

Sub-Section Number : 8

Sub-Section Id : 640653201961

Question Shuffling Allowed : No

Question Id : 6406531279589 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (240 to 241)

Question Label : Comprehension

Suppose that we want to simulate a discrete random variable X using the composition method such that:

$$P(X = k) = 0.3p_k^{(1)} + 0.7p_k^{(2)} \quad \text{for } k = 1, 2, 3, 4, 5$$

where,

$$p_k^{(1)} = P(X_1 = k) = \begin{cases} 0.2, & k = 1 \\ 0.5, & k = 2 \\ 0.3, & k = 3 \\ 0, & \text{otherwise} \end{cases}$$

and

$$p_k^{(2)} = P(X_2 = k) = \begin{cases} 0.4, & k = 4 \\ 0.6, & k = 5 \\ 0, & \text{otherwise} \end{cases}$$

Based on the given information, answer the subquestions.

Sub questions

Question Number : 240 Question Id : 6406531279590 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

What is the value of $P(X = 2)$? Enter the answer correct to two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.15

Question Number : 241 Question Id : 6406531279591 Question Type : MSQ

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Choose the correct options from the following. Select all that apply.

Options :

$$X = \begin{cases} X_1, & \text{with probability 0.5} \\ X_2, & \text{with probability 0.5} \end{cases}$$

6406534314092. *

6406534314093. ✓

$$X = \begin{cases} X_1, & \text{with probability 0.3} \\ X_2, & \text{with probability 0.7} \end{cases}$$

- Draw $U \sim U[0, 1]$
- If $U \leq 0.3$ then simulate X_1 else simulate X_2 and stop.

6406534314094. ✓

- Draw $U \sim U[0, 1]$
- If $U \leq 0.5$ then simulate X_1 else simulate X_2 and stop.

6406534314095. ✘

Sub-Section Number :

9

Sub-Section Id :

640653201962

Question Shuffling Allowed :

No

Question Id : 6406531279592 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (242 to 243)

Question Label : Comprehension

The below code implements the ratio-of-uniform method. Study the code carefully and answer the given subquestions:

```
1 nu <- 2
2
3 drawfrom_rect <- function(a, b, c) {
4   u <- runif(1, min = 0, max = a)
5   v <- runif(1, min = b, max = c)
6   return(c(u, v))
7 }
8 sqrt.f <- function (x) sqrt(dt(x, df = nu))
9
10 a <- 1
11 b <- -0.87
12 c <- 0.87
13
14 N <- 1e4
15 samp <- numeric(length = N)
16 i <- 1
17 counter <- 0
18
19 while(i <= N)
20 {
21   counter <- counter + 1
22   prop <- drawfrom_rect(a = a, b = b, c = c)
23   u <- prop[1]
24   v <- prop[2]
25   x <- v / u
26   if (u <= sqrt.f(x)) {
27     samp[i] <- x
28     i <- i + 1
29   }
30 }
31
32 counter
33
34 ## Output
35 > counter
36 [1] 34428
```

Sub questions

Question Number : 242 Question Id : 6406531279593 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Identify the target distribution.

Options :

6406534314096. ✘ Normal(0, 1)

6406534314097. ✘ Cauchy distribution

6406534314098. ✓ *t*-distribution with 2 degrees of freedom

6406534314099. ✘ *t*-distribution with 3 degrees of freedom

Question Number : 243 Question Id : 6406531279594 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Find the estimate of the probability of acceptance using the given code. Enter the answer correct to three decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.288 to 0.292

Market Research

Section Id :	64065391706
Section Number :	13
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	9
Number of Questions to be attempted :	9
Section Marks :	50
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653201963
Question Shuffling Allowed :	No

Question Number : 244 Question Id : 6406531279595 Question Type : MCQ

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 :

6406534314101. ✓ YES

6406534314102. ✗ NO

Sub-Section Number : 2

Sub-Section Id : 640653201964

Question Shuffling Allowed : No

Question Id : 6406531279596 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (245 to 254)

Question Label : Comprehension

For the given statements with respect to questionnaire design and scales. Pl indicate true / false for the each subquestions

Sub questions

Question Number : 245 Question Id : 6406531279597 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Excessive use of open-ended questions in a quantitative study questionnaire indicate that the researcher is being lazy

Options :

6406534314103. ✓ True

6406534314104. ✗ False

Question Number : 246 Question Id : 6406531279598 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Very often, good quality responses are not given by respondents for open-ended questions

Options :

6406534314105. ✓ True

6406534314106. ✗ False

Question Number : 247 Question Id : 6406531279599 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

When deciding which scale to use in a questionnaire, it is better to continue using the same scale with which the researcher has prior experience

Options :

6406534314107. ✓ True

6406534314108. ✗ False

Question Number : 248 Question Id : 6406531279600 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

A balanced scale is generally preferable to an unbalanced scale

Options :

6406534314109. ✓ True

6406534314110. ✗ False

Question Number : 249 Question Id : 6406531279601 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

When there is a mid-point on a scale, most respondents prefer to choose it

Options :

6406534314111. ✘ True

6406534314112. ✓ False

Question Number : 250 Question Id : 6406531279602 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

The findings from a scale questions must be normally distributed

Options :

6406534314113. ✘ True

6406534314114. ✓ False

Question Number : 251 Question Id : 6406531279603 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Good translation is very important for getting a questionnaire right

Options :

6406534314115. ✓ True

6406534314116. ✘ False

Question Number : 252 Question Id : 6406531279604 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

The flow of a questionnaire is one of the first and most important steps in writing it

Options :

6406534314117. ✓ True

6406534314118. ✘ False

Question Number : 253 Question Id : 6406531279605 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

The scale shown here is a balanced scale since the term “above average” can be interpreted as a neutral point- very poor, somewhat poor, above average, somewhat good, very good

Options :

6406534314119. ✘ True

6406534314120. ✓ False

Question Number : 254 Question Id : 6406531279606 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Using consumer speak is more important than the technically exact marketing term in a questionnaire

Options :

6406534314121. ✓ True

6406534314122. ✗ False

Sub-Section Number :

3

Sub-Section Id :

640653201965

Question Shuffling Allowed :

No

Question Id : 6406531279607 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (255 to 269)

Question Label : Comprehension

For the given statements with respect to qualitative research. Pl indicate true / false for the each subquestions .

Sub questions

Question Number : 255 Question Id : 6406531279608 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

The laddering technique works better in individual depth interviews than in GDs

Options :

6406534314123. ✓ True

6406534314124. ✗ False

Question Number : 256 Question Id : 6406531279609 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

If we use laddering in DIs, we can identify the most common nodal points in the ladder and build a strategy around that

Options :

6406534314125. ✓ True

6406534314126. ✗ False

Question Number : 257 Question Id : 6406531279610 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

A wide range of knowledge of people's cultures and behaviour is useful for a researcher

Options :

6406534314127. ✓ True

6406534314128. ✗ False

Question Number : 258 Question Id : 6406531279611 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

We should always record any discussion only after informing the respondents and taking prior permission from them

Options :

6406534314129. ✓ True

6406534314130. ✗ False

Question Number : 259 Question Id : 6406531279612 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Quali researchers use brand grouping exercises to help identify the dimensions driving brand choice

Options :

6406534314131. ✓ True

6406534314132. ✗ False

Question Number : 260 Question Id : 6406531279613 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Projective techniques need a skilled moderator to provide reliable results

Options :

6406534314133. ✓ True

6406534314134. ✗ False

Question Number : 261 Question Id : 6406531279614 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Quali research is much more useful than quantitative research to understand consumer motivations

Options :

6406534314135. ✓ True

6406534314136. ✗ False

Question Number : 262 Question Id : 6406531279615 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

A group discussion works best when there are 7 to 9 respondents

Options :

6406534314137. ✓ True

6406534314138. ✗ False

Question Number : 263 Question Id : 6406531279616 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Trained respondents make it easier to get high quality data

Options :

6406534314139. ✗ True

6406534314140. ✓ False

Question Number : 264 Question Id : 6406531279617 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Qualitative research generally uses probability sampling

Options :

6406534314141. ✘ True

6406534314142. ✓ False

Question Number : 265 Question Id : 6406531279618 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

When moderated skilfully, GDs can be used for demand estimation

Options :

6406534314143. ✘ True

6406534314144. ✓ False

Question Number : 266 Question Id : 6406531279619 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Quanti research is the preferred choice when we need to estimate the % who are aware of a brand

Options :

6406534314145. ✓ True

6406534314146. ✘ False

Question Number : 267 Question Id : 6406531279620 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Any kind of measurement necessarily requires quali research

Options :

6406534314147. ✘ True

6406534314148. ✓ False

Question Number : 268 Question Id : 6406531279621 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Quali research is more useful than quanti for understanding the consumers' thought processes

Options :

6406534314149. ✓ True

6406534314150. ✘ False

Question Number : 269 Question Id : 6406531279622 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Understanding consumer behaviour patterns requires probability sampling

Options :

6406534314151. ✓ True

6406534314152. ✗ False

Sub-Section Number :

4

Sub-Section Id :

640653201966

Question Shuffling Allowed :

No

Question Id : 6406531279623 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (270 to 274)

Question Label : Comprehension

For each of the given situations, what sampling method is optimal in the subquestions

Sub questions

Question Number : 270 Question Id : 6406531279624 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

A retailer wants to do a study over phone among those who have bought earlier but have not come back in the last two years. They have a list of all such lapsed customers with their name and phone number. The required sample size is 300 customers.

Options :

6406534314153. ✘ Multistage cluster sampling

6406534314154. ✘ Stratified sampling

6406534314155. ✘ Quota sampling

6406534314156. ✓ Systematic sampling

6406534314157. ✘ Convenience sampling

Question Number : 271 Question Id : 6406531279625 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

A company plans to do a house-to-house field survey to find the awareness of health insurance. The required sample size is 600, spread across upper middle class households

Options :

6406534314158. ✓ Multistage cluster sampling

6406534314159. ✘ Stratified sampling

6406534314160. ✘ Quota sampling

6406534314161. ✘ Systematic sampling

6406534314162. ✘ Convenience sampling

Question Number : 272 Question Id : 6406531279626 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

A hospital chain wants to find out how satisfied the discharged patients are and if they will recommend the hospital to others. The hospital wants a sample size of 300 discharged patients selected in such a way as to ensure proportionate representation to those who underwent surgery, were in the ICU, etc.

Options :

6406534314163. ✘ Multistage cluster sampling

6406534314164. ✘ Stratified sampling

6406534314165. ✘ Quota sampling

6406534314166. ✓ Systematic sampling

6406534314167. ✘ Convenience sampling

Question Number : 273 Question Id : 6406531279627 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

An insurance firm wants to conduct a small sample study to understand the attitude of families towards health insurance as a product. The required sample size is 20, and the nature of probing will be in-depth.

Options :

6406534314168. ✘ Multistage cluster sampling

6406534314169. ✘ Stratified sampling

6406534314170. ✘ Quota sampling

6406534314171. ✘ Systematic sampling

6406534314172. ✓ Convenience sampling

Question Number : 274 Question Id : 6406531279628 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

A hair care company plans to test out a new serum concept meant for controlling hair loss among young women. The targeted sample size is 30 and the probing will be qualitative in nature

Options :

6406534314173. ✘ Multistage cluster sampling

6406534314174. ✘ Stratified sampling

6406534314175. ✘ Quota sampling

6406534314176. ✘ Systematic sampling

6406534314177. ✓ Convenience sampling

Sub-Section Number :

5

Sub-Section Id :

640653201967

Question Shuffling Allowed :

Yes

Question Number : 275 Question Id : 6406531279629 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

A manufacturer of moisturizing lotions wants to do a sample survey about the brand standing of its brand. It plans to do a house-to-house multistage cluster sampling survey. The company classifies its customers based on skin type (dry / oily / normal) and age (Young / Early middle age / Late middle age / Elder) and customizes its designs accordingly. The company wants to do the study in two cities. The company wants to have a robust sample size in EACH city with no compromises. What should be the sample size?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

720

Question Number : 276 Question Id : 6406531279630 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

An insurance firm decides to do a customer satisfaction study and decides that the key metric will be the mean score of satisfaction measured on a 5 point scale (from very poor to very good). The company wants to be 95% confident that the findings on the mean score on the 5 point scale is plus or minus 10% accurate. What should be the sample size?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

172

Question Number : 277 Question Id : 6406531279631 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

If the company instead decides that the key metric is the percentage of customers who give 4 or 5 on the 5-point scale, and wants the same level of accuracy (plus or minus 10% accurate) and confidence (95%), then what should be the sample size?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

96

Sub-Section Number : 6

Sub-Section Id : 640653201968

Question Shuffling Allowed : No

Question Id : 6406531279632 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (278 to 279)

Question Label : Comprehension

A family consists of Mr. Chandrashekhar who is 54, his wife Mrs. Amala who is 49, and his daughter Rama Priya who is 25 (all of whom live in the same house in Bangalore). Mr. Chandrashekhar is a former bank officer who took voluntary retirement due to ill health and contributes some pension money to the running of the household. Mrs. Amala has always been a homemaker and continues to cook and keep house for the family. Rama Priya is a software executive and is the main contributor to the family running.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 278 Question Id : 6406531279633 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

In the given description, who is the Chief Wage Earner...?

Options :

6406534314181. ❌ Mr Chandrashekhar

6406534314182. ❌ Mrs. Amala

6406534314183. ✓ Rama Priya

Question Number : 279 Question Id : 6406531279634 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

In the given description, who is the householder?

Options :

6406534314184. ❌ Mr Chandrashekhar

6406534314185. ✓ Mrs. Amala

6406534314186. ❌ Rama Priya

Sub-Section Number :

7

Sub-Section Id :

640653201969

Question Shuffling Allowed :

No

Question Id : 6406531279635 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (280 to 284)

Question Label : Comprehension

Please look at the grid below and identify the SEC under the following situations of the household

PLEASE USE THE GRID BELOW TO DETERMINE THE SEC							
SOCIO ECONOMIC CLASSIFICATION (URBAN) GRID							
Occupation	Illiterate	School upto 4 yrs / literate but no formal schooling	School 5-9 years	SS C / HSC	Some College but not Graduate	Graduate / Post Graduate - General	Graduate / Post Graduate - Professional
Unskilled Workers	E2	E2	E1	D	D	D	D
Skilled Workers	E2	E1	D	C	C	B2	B2
Petty Traders	E2	D	D	C	C	B2	B2
Shop Owners	D	D	C	B2	B1	A2	A2
Businessmen / Industrialist With employees : 0	D	C	B2	B1	A2	A2	A1
1 to 9	C	B2	B2	B1	A2	A1	A1
10 +	B1	B1	A2	A2	A1	A1	A1
Self Employed Professionals	D	D	D	B2	B1	A2	A1
Clerical / Salesmen	D	D	D	D	B2	B1	B1
Supervisory level	D	D	D	D	B2	B1	A2
Officers / Executives – Junior	C	C	C	B2	B1	A2	A2
Officers/ Executives - Middle/Senior	B1	B1	B1	B1	A2	A1	A1

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 280 Question Id : 6406531279636 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

A family of three. All three are graduates. Father is a bank officer in middle management who is close to retirement age, mother a homemaker, son working in a software firm in junior

management role. The father's pension is used for running the household, but the son is the highest earning member in the household

Options :

6406534314187. ✘ B1

6406534314188. ✓ A1

6406534314189. ✘ A2

6406534314190. ✘ C

6406534314191. ✘ D

Question Number : 281 Question Id : 6406531279637 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

A couple. Husband is a CA, works as the VP Marketing in an FMCG firm. The wife is also employed and takes care of the household expenses. She is a Principal in a city school. She is a doctorate with a PhD in literature

Options :

6406534314192. ✘ B1

6406534314193. ✓ A1

6406534314194. ✘ A2

6406534314195. ✘ C

6406534314196. ✘ D

Question Number : 282 Question Id : 6406531279638 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

A middle-aged couple with a 22 year daughter who is about to start working in the software industry. Husband is a graduate in Visual Communications and runs his own advertising agency business with three employees. Wife is also a graduate and works part-time in the husband's firm. The husband's salary is used for meeting monthly household expenses.

Options :

6406534314197. ✘ B1

6406534314198. ✓ A1

6406534314199. ✘ A2

6406534314200. ✘ C

6406534314201. ✘ D

Question Number : 283 Question Id : 6406531279639 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

A young couple with a child of 8 years old. Father is a college dropout who runs a garment retail shop with two assistants. Mother is a post graduate who does part time work from home. Income of both are used to meet household running expenses – in the ratio of 75:25 between the husband

and wife

Options :

6406534314202. ✘ B1

6406534314203. ✘ A1

6406534314204. ✓ A2

6406534314205. ✘ C

6406534314206. ✘ D

Question Number : 284 Question Id : 6406531279640 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

A family of five. Husband is the bodyguard of a famous film star and Wife does the cooking in the same star's house. No children. The husband has studied till 12th class in school and the wife is just about literate but has no formal schooling. The husband takes care of managing the expenses for the whole family

Options :

6406534314207. ✘ B1

6406534314208. ✘ A1

6406534314209. ✘ A2

6406534314210. ✓ C

6406534314211. ✘ D

Managerial Economics

Section Id :	64065391707
Section Number :	14
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	10
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 :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1

Sub-Section Id :

640653201970

Question Shuffling Allowed :

No

Question Number : 285 Question Id : 6406531279641 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : MANAGERIAL ECONOMICS (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 :

6406534314212. ✓ YES

6406534314213. ✗ NO

Sub-Section Number :

2

Sub-Section Id :

640653201971

Question Shuffling Allowed :

No

Question Id : 6406531279642 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (286 to 289)

Question Label : Comprehension

Imagine that you have started a snack food delivery business on your college campus. Students send you orders for snacks, such as potato chips and candy bars, via the Internet. You shop at local grocery stores to fill these orders and then deliver the orders. To operate this business, you pay \$500 a month to lease computer time from a local Web-hosting company to use its server to host and maintain your website. You also own a sports utility vehicle (SUV) that you use to make deliveries. Your monthly car payment is \$300, and you pay \$100 a month in insurance costs. Each order that you fill takes, on average, a half hour and consumes \$0.50 worth of gasoline. When you fill an order, you pay the grocer for the merchandise. You then collect a payment, including a delivery fee, from the students to whom you sell. If you did not operate this business, you could work at the campus dining hall, earning \$6 an hour. Right now, you operate your business five days a week, Monday through Friday. On weekends, your business is idle, and you work in the campus dining hall.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 286 Question Id : 6406531279643 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Your explicit costs include

Options :

6406534314214. ✘ Leasing computer time

6406534314215. ✘ Gasoline

6406534314216. ✘ Money you pay grocers

6406534314217. ✓ All of these

Question Number : 287 Question Id : 6406531279644 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Your implicit cost will be

Options :

6406534314218. ✘ \$300 car payment

6406534314219. ✘ \$100 a month insurance cost

6406534314220. ✓ Your wage at campus dining hall \$6 an hour

6406534314221. ✘ All of these

Question Number : 288 Question Id : 6406531279645 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Last week you purchased five large cases of Fritos for a customer who, as it turned out, did not accept delivery. You paid \$200 for these cases. You have a deal with your grocers that they will pay you \$0.5 for each dollar of returned merchandise. Just this week, you found a fraternity on campus that will buy the five cartons for \$125 (and will pick them up from your apartment, relieving you of the need to deliver them to the frat house).

What is the opportunity cost of filling this order in \$ (i.e., selling these cartons to the fraternity)?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 289 Question Id : 6406531279646 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Last week you purchased five large cases of Fritos for a customer who, as it turned out, did not accept delivery. You paid \$200 for these cases. You have a deal with your grocers that they will pay you \$0.5 for each dollar of returned merchandise. Just this week, you found a fraternity on campus that will buy the five cartons for \$125 (and will pick them up from your apartment, relieving you of the need to deliver them to the frat house).

Should you sell the Fritos to the fraternity?_____

Options :

6406534314223. ✓ Yes

6406534314224. ✗ No

Question Id : 6406531279647 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (290 to 291)

Question Label : Comprehension

A consumer has a utility function $U(x, y) = y\sqrt{x}$.

Answer the given subquestions for this consumer.

Sub questions

Question Number : 290 Question Id : 6406531279648 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Choose the correct alternative

Options :

6406534314225. ✓ This consumer believes that more is better for each good, x and y

6406534314226. ✗ Marginal utility of the good x is independent of x and marginal utility of the good y is independent of y

6406534314227. ✗ Both this consumer believes that more is better for each good, x and y & Marginal utility of the good x is independent of x and marginal utility of the good y is independent of y

6406534314228. ✗ None

Question Number : 291 Question Id : 6406531279649 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Choose the incorrect alternative

Options :

6406534314229. ✗ This consumer's preferences exhibit a diminishing marginal utility of x

6406534314230. ✓ This consumer's preferences exhibit a diminishing marginal utility of y

6406534314231. ✗ Both this consumer's preferences exhibit a diminishing marginal utility of x & This consumer's preferences exhibit a diminishing marginal utility of y

6406534314232. ✗ None

Sub-Section Number : 3

Sub-Section Id : 640653201972

Question Shuffling Allowed : No

Question Id : 6406531279650 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (292 to 294)

Question Label : Comprehension

Suppose that the firm's production function is of the form $Q = 50\sqrt{LK}$.

Suppose that the price of labor w is \$20 per unit and the price of capital r is \$5 per unit.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 292 Question Id : 6406531279651 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

The ratio $\frac{K}{L}$ is

Options :

6406534314233. ✓ 4

6406534314234. ✗ $\frac{1}{4}$

6406534314235. ✗ 5

6406534314236. ✗ $\frac{1}{5}$

Question Number : 293 Question Id : 6406531279652 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

What is the cost-minimizing input combination if the firm wants to produce 1,000 units per year?

$L^* =$ _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 294 Question Id : 6406531279653 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

What is the cost-minimizing input combination if the firm wants to produce 1,000 units per year?

K^* = _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

40

Question Id : 6406531279660 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (295 to 297)

Question Label : Comprehension

The short run cost function of a company is given by the equation

$TC = 300 + 50q + q^2$, where TC is total cost and q is no of units produced.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 295 Question Id : 6406531279661 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

What will be the average fixed cost if company produces 50 units _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

6

Question Number : 296 Question Id : 6406531279662 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

What is marginal cost of company at q=50? _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

150

Question Number : 297 Question Id : 6406531279663 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

What is average variable cost at q=50? _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Sub-Section Number :

4

Sub-Section Id :

640653201973

Question Shuffling Allowed :

No

Question Id : 6406531279654 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (298 to 302)

Question Label : Comprehension

Suppose that we have the linear production function $Q = 5L + 2K$.

Suppose that the price of labor w is \$5 per unit and that the price of capital services r is \$2 per unit.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 298 Question Id : 6406531279655 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Marginal Product of Labour MP_L is _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

5

Question Number : 299 Question Id : 6406531279656 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Marginal Product of Capital MP_K is _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

2

Question Number : 300 Question Id : 6406531279657 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Find the optimal input combination given that the firm wishes to produce 200 units of output.

$L^* =$ _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0

Question Number : 301 **Question Id :** 6406531279658 **Question Type :** SA

Correct Marks : 2

Question Label : Short Answer Question

Find the optimal input combination given that the firm wishes to produce 200 units of output.

K^* = _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 302 **Question Id :** 6406531279659 **Question Type :** SA

Correct Marks : 1

Question Label : Short Answer Question

Total cost of production for 200 units of output will be (in \$) _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

200

Sub-Section Number :

5

Sub-Section Id :

640653201974

Question Shuffling Allowed :

Yes

Question Number : 303 Question Id : 6406531279664 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

The Cobb-Douglas production function $F(K,L)=K^pL^q$

Options :

6406534314247. ❌ Never exhibits decreasing returns to scale

6406534314248. ✓ Shows constant returns to scale if $p+q=1$

6406534314249. ❌ Has constant marginal product of labour

6406534314250. ❌ Has constant marginal product of capital

Question Number : 304 Question Id : 6406531279665 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

When average product is decreasing in labor, marginal product is greater than average product.

Options :

6406534314251. ❌ TRUE

6406534314252. ✓ FALSE

Question Number : 305 Question Id : 6406531279666 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

When average product is increasing in labor, marginal product is less than average product.

Options :

6406534314253. ❌ TRUE

6406534314254. ✓ FALSE

Question Number : 306 Question Id : 6406531279667 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

When average product AP_L is at a maximum, then marginal product is equal to average product

Options :

6406534314255. ✓ TRUE

6406534314256. ❌ FALSE

Game Theory and Strategy

Section Id : 64065391708

Section Number : 15

Section type : Online

Mandatory or Optional : Mandatory

Number of Questions :	5
Number of Questions to be attempted :	5
Section Marks :	20
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653201975
Question Shuffling Allowed :	No

Question Number : 307 Question Id : 6406531279668 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : GAME THEORY AND STRATEGY (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 :

6406534314257. ✓ YES

6406534314258. ✗ NO

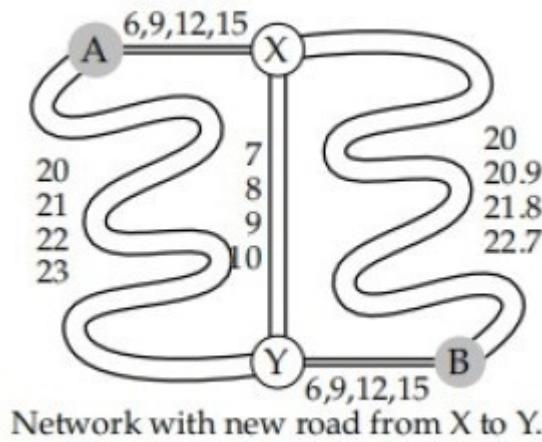
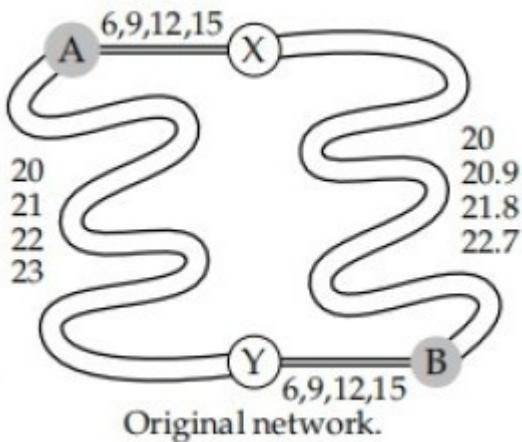
Sub-Section Number :	2
Sub-Section Id :	640653201976
Question Shuffling Allowed :	No

Question Id : 6406531279669 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (308 to 309)

Question Label : Comprehension

(Choosing a route)Four people must drive from A to B at the same time. Two routes are available, one via X and one via Y (Refer to the left panel of following Figure). The roads from A to X, and from Y to B are both short and narrow; in each case, one car takes 6 minutes, and each additional car increases the travel time per car by 3 minutes. (If two cars drive from A to X, for example, each car takes 9 minutes.) The roads from A to Y, and from X to B are long and wide; on A to Y one car takes 20 minutes, and each additional car increases the travel time per car by 1 minute; on X to B one car takes 20 minutes, and each additional car increases the travel time per car by 0.9 minutes. Formulate this situation as a strategic game



Based on the above data, answer the given subquestions.

Sub questions

Question Number : 308 Question Id : 6406531279670 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Choose the correct alternative .

Options :

6406534314259. ✓ In Nash equilibrium two people take each route

6406534314260. ✗ For the NE action profile, each person's travel time is 28 minutes

6406534314261. ✗ Both In Nash equilibrium two people take each route and For the NE action profile, each person's travel time is 28 minutes

6406534314262. ✗ None

Question Number : 309 Question Id : 6406531279671 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Now suppose that a relatively short, wide road is built from X to Y, giving each person four options for travel from A to B: A-X-B, A-Y-B, A-X-Y-B, and A-Y-X-B (As shown in the right panel of the given figure). Assume that a person who takes A-X-Y-B travels the A-X portion at the same time as

someone who takes A-X-B, and the Y-B portion at the same time as someone who takes A-Y-B. (Think of there being constant flows of traffic.) On the road between X and Y, one car takes 7 minutes and each additional car increases the travel time per car by 1 minute. Find the Nash equilibrium in this new situation

Choose the correct alternative

Options :

6406534314263. ❌ In any Nash equilibrium, one person takes A-X-B, two people take A-X-Y-B, and one person takes A-Y-B

6406534314264. ❌ In this equilibrium profile, every person's travel time increases compared to the case when new road was not there

6406534314265. ✓ Both In any Nash equilibrium, one person takes A-X-B, two people take A-X-Y-B, and one person takes A-Y-B and In this equilibrium profile, every person's travel time increases compared to the case when new road was not there

6406534314266. ❌ None

Sub-Section Number :

3

Sub-Section Id :

640653201977

Question Shuffling Allowed :

No

Question Id : 6406531279672 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (310 to 316)

Question Label : Comprehension

Determined to crack down on the drug trade, a city mayor puts more officers out on patrol to disrupt the business of drug dealers. A drug dealer in a neighborhood can work his trade either on a street corner or in the park. Each day, he decides where to set up shop, knowing that word about his location will travel among users. Because a good snitch is lacking, word does not travel to the police. The police officer on the beat then needs to decide whether she will patrol the park or the street corner, while not knowing where the drug dealer is hanging out that day.

The decision of the officer and the dealer determine the extent of drug trades that day. Let suppose the total number of potential trades in the market is 500. A dealer's payoff is determined by the number of trades he consummates, while the officer's payoff is based on the number of trades she disrupts. The table below illustrates the payoffs for both parties according to their respective strategies in the game.

		Drug Dealer	
		Street Corner	Park
Police Officer	Street Corner	400, 100	0, 500
	Park	100, 400	300, 200

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 310 Question Id : 6406531279673 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Choose the correct statement

Options :

6406534314267. ✘ There is a unique Nash equilibrium in pure strategy

6406534314268. ✘ There are finitely many Nash equilibria in this game in pure strategy

6406534314269. ✓ There is no Nash equilibrium in this game in pure strategy

6406534314270. ✘ None

Question Number : 311 Question Id : 6406531279674 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Choose the correct statement .

Options :

6406534314271. ✓ There is a unique Nash equilibrium in this game

6406534314272. ✘ There are finitely many Nash equilibria in this game

6406534314273. ✎ There is no Nash equilibrium in this game

6406534314274. ✎ None

Question Number : 312 Question Id : 6406531279675 Question Type : SA

Correct Marks : 0.5

Question Label : Short Answer Question

If randomization probability of a police officer for patrolling the streets is p/q , then $p = \underline{\hspace{2cm}}$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 313 Question Id : 6406531279676 Question Type : SA

Correct Marks : 0.5

Question Label : Short Answer Question

If randomization probability of a police officer for patrolling the streets is p/q , then $q = \underline{\hspace{2cm}}$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

3

Question Number : 314 Question Id : 6406531279677 Question Type : SA

Correct Marks : 0.5

Question Label : Short Answer Question

If randomization probability of a police officer for patrolling the park is r/s , then $r = \underline{\hspace{2cm}}$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

2

Question Number : 315 Question Id : 6406531279678 Question Type : SA

Correct Marks : 0.5

Question Label : Short Answer Question

If randomization probability of a police officer for patrolling the park is r/s , then $s = \underline{\hspace{10cm}}$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

3

Question Number : 316 Question Id : 6406531279679 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

If randomization probability of the drug dealer choosing street is β , then $\beta = \underline{\hspace{10cm}}$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.5

Sub-Section Number :

4

Sub-Section Id :

640653201978

Question Shuffling Allowed :

No

Question Id : 6406531279680 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (317 to 324)

Question Label : Comprehension

Consider a two-player game in which player 1 can choose A or B. The game ends if he chooses A while it continues to player 2 if he chooses B. Player 2 can either choose C or D, with the game ending after C and continuing again with player 1 after D. Player 1 then can choose E or F, and then the game ends after each of these choices.

Imagine that the payoffs following choice A by player 1 are (2, 0), following C by player 2 are (3, 1), following E by player 1 are (0, 0) and following F by player 1 are (1, 2) Model this as an extensive form game and answer the given subquestions:

Sub questions

Question Number : 317 Question Id : 6406531279681 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

This is a game of

Options :

6406534314280. Perfect information

6406534314281. Imperfect information

6406534314282. None

6406534314283. Can't be determined

Question Number : 318 Question Id : 6406531279682 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

How many terminal nodes does this game have?

Options :

6406534314284. 3

6406534314285. 2

6406534314286. 4

6406534314287. 5

Question Number : 319 Question Id : 6406531279683 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

How many information sets does this game have?

Options :

6406534314288. 2

6406534314289. 3

6406534314290. 4

6406534314291. 1

Question Number : 320 Question Id : 6406531279684 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

How many pure strategies does player 1 have?

Options :

6406534314292. ✘ 1

6406534314293. ✘ 2

6406534314294. ✘ 3

6406534314295. ✓ 4

Question Number : 321 Question Id : 6406531279685 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

How many pure strategies does player 2 have?

Options :

6406534314296. ✘ 1

6406534314297. ✓ 2

6406534314298. ✘ 3

6406534314299. ✘ 4

Question Number : 322 Question Id : 6406531279686 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

How many pure strategy Nash equilibria does this game have?

Options :

6406534314300. ✘ 1

6406534314301. ✘ 2

6406534314302. ✓ 3

6406534314303. ✘ 4

Question Number : 323 Question Id : 6406531279687 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

Which one of the Nash equilibria is also a subgame perfect equilibrium?

Options :

6406534314304. ✘ (AE, D)

6406534314305. ✓ (AF, D)

6406534314306. ✘ (BE, C)

6406534314307. ✘ (BF, C)

Question Number : 324 Question Id : 6406531279688 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

No. of sub games this game has

Options :

6406534314308. ✘ 1

6406534314309. ✘ 2

6406534314310. ✓ 3

6406534314311. ✘ 4

Sub-Section Number : 5

Sub-Section Id : 640653201979

Question Shuffling Allowed : No

Question Id : 6406531279689 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (325 to 326)

Question Label : Comprehension

(Synergies) Two division managers can invest time and effort in creating a better working relationship. Each invests $e_i \geq 0$, and if both invest more, then both are better off, but it is costly for each manager to invest. In particular, the payoff function for player i from effort levels (e_i, e_j) is $v_i(e_i, e_j) = (a + e_j)e_i - e_i^2$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 325 Question Id : 6406531279690 Question Type : MCQ

Correct Marks : 1

Question Label : Multiple Choice Question

If $BR_i(e_j)$ the best response function of player i

for all $e_i \geq 0$, $\frac{BR_i(a)}{a}$ will be

Options :

6406534314312. ✓ 1

6406534314313. ✗ 1/2

6406534314314. ✗ 2

6406534314315. ✗ 1/3

Question Number : 326 Question Id : 6406531279691 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Choose the correct alternative.

Options :

6406534314316. ✓ Under Nash equilibrium both players choose $e_1 = e_2 = a$.

6406534314317. ✗ Equilibrium payoff of a player will be $2a^2$

6406534314318. ✗ Both Under Nash equilibrium both players choose Under Nash equilibrium both players choose $e_1 = e_2 = a$ and Equilibrium payoff of a player will be $2a^2$

6406534314319. ✗ None