Question 1:

'The access matrix approach to protection has the difficulty that', A. 'the matrix, if stored directly, is large and can be clumsy to manage', B. 'it is not capable of expressing complex protection requirements', C. 'deciding whether a process has access to a resource is undecidable', D. 'there is no way to express who has rights to change the access matrix itself'

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Answer Option 1:

Final Answer: A

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Answer Option 2:

Final Answer: A

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Answer Option 3:

Final Answer: A

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Answer Option 4:

Final Answer: A

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Answer Option 5:

Final Answer: A

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Answer Option 6:

Final Answer: A

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Answer Option 7:

Final Answer: A

****

Answer Option 8:

Final Answer: A

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Answer Option 9:

Final Answer: A

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Question 2:

'An integer c is a common divisor of two integers x and y if and only if c is a divisor of x and c is a divisor of y. Which of the following sets of integers could possibly be the set of all common divisors of two integers?', A. '{-6,-2, -1, 1, 2, 6}', B. '{-6, -2, -1, 0, 1, 2, 6}', C. '{-6, -3, -2, -1, 1, 2, 3, 6}', D. '{-6, -3, -2, -1, 0, 1, 2, 3, 6}'

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Answer Option 1:

Final Answer: A

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Answer Option 2:

Final Answer: A

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Answer Option 3:

Final Answer: A

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Answer Option 4:

Final Answer: A

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Answer Option 5:

Final Answer: A

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Answer Option 6:

Final Answer: A

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Answer Option 7:

Final Answer: A

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Answer Option 8:

Final Answer: A

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Answer Option 9:

Final Answer: A

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Question 3:

'In the NoNicks operating system, the time required by a single file-read operation has four nonoverlapping components:

disk seek time-25 msec

disk latency time-8 msec

disk transfer time- 1 msec per 1,000 bytes

operating system overhead-1 msec per 1,000 bytes + 10 msec

In version 1 of the system, the file read retrieved blocks of 1,000 bytes. In version 2, the file read (along with the underlying layout on disk) was modified to retrieve blocks of 4,000 bytes. The ratio of-the time required to read a large file under version 2 to the time required to read the same large file under version 1 is approximately', A. '1:4', B. '1:3.5', C. '1:1', D. '1.1:1'

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Answer Option 1:

Final Answer: C

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Answer Option 2:

Final Answer: B

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Answer Option 3:

Final Answer: D

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Answer Option 4:

Final Answer: C

****

Answer Option 5:

Final Answer: B

****

Answer Option 6:

Final Answer: D

****

Answer Option 7:

Final Answer: D

****

Answer Option 8:

Final Answer: B

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Answer Option 9:

Final Answer: C

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Question 4:

'You want to cluster 7 points into 3 clusters using the k-Means Clustering algorithm. Suppose after the first iteration, clusters C1, C2 and C3 contain the following two-dimensional points: C1 contains the 2 points: {(0,6), (6,0)} C2 contains the 3 points: {(2,2), (4,4), (6,6)} C3 contains the 2 points: {(5,5), (7,7)} What are the cluster centers computed for these 3 clusters?', A. 'C1: (3,3), C2: (4,4), C3: (6,6)', B. 'C1: (3,3), C2: (6,6), C3: (12,12)', C. 'C1: (6,6), C2: (12,12), C3: (12,12)', D. 'C1: (0,0), C2: (48,48), C3: (35,35)'

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Answer Option 1:

Final Answer: A

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Answer Option 2:

Final Answer: A

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Answer Option 3:

Final Answer: A

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Answer Option 4:

Final Answer: A

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Answer Option 5:

Final Answer: A

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Answer Option 6:

Final Answer: A

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Answer Option 7:

Final Answer: A

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Answer Option 8:

Final Answer: A

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Answer Option 9:

Final Answer: A

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Question 5:

'Any set of Boolean operators that is sufficient to represent all Boolean expressions is said to be complete. Which of the following is NOT complete?', A. '{AND, NOT}', B. '{NOT, OR}', C. '{AND, OR}', D. '{NAND}'

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Answer Option 1:

Final Answer: C

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Answer Option 2:

Final Answer: C

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Answer Option 3:

Final Answer: C

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Answer Option 4:

Final Answer: C

****

Answer Option 5:

Final Answer: C

****

Answer Option 6:

Final Answer: C

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Answer Option 7:

Final Answer: C

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Answer Option 8:

Final Answer: C

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Answer Option 9:

Final Answer: C

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Question 6:

'Consider the collection of all undirected graphs with 10 nodes and 6 edges. Let M and m, respectively, be the maximum and minimum number of connected components in any graph in the collection. If a graph has no selfloops and there is at most one edge between any pair of nodes, which of the following is true?', A. 'M = 10, m = 10', B. 'M = 10, m = 1', C. 'M = 7, m = 4', D. 'M = 6, m = 4'

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Answer Option 1:

Final Answer: D

****

Answer Option 2:

Final Answer: C

****

Answer Option 3:

Final Answer: C

****

Answer Option 4:

Final Answer: C

****

Answer Option 5:

Final Answer: C

****

Answer Option 6:

Final Answer: C

****

Answer Option 7:

Final Answer: C

****

Answer Option 8:

Final Answer: D

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Answer Option 9:

Final Answer: D

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Question 7:

'Resolution theorem proving for showing that a formula of propositional logic is not satisfiable has which of the following properties?

I. It is a sound proof system in the sense that there does not exist a proof of the unsatisfiability of a satisfiable formula of propositional logic.

II. It is a complete proof system in the sense that there is a proof of unsatisfiability for every unsa tisfiable formula of propositional logic.

III. It is a succinct proof system in the sense that whenever an unsatisfiable formula F of propositional logic has a resolution proof, F also has a proof whose length is polynomial in the length of F.', A. 'I only',

B. 'III only', C. 'I and II only', D. 'I and III only'

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Answer Option 1:

Final Answer: C

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Answer Option 2:

Final Answer: C

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Answer Option 3:

Final Answer: C

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Answer Option 4:

Final Answer: C

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Answer Option 5:

Final Answer: C

****

Answer Option 6:

Final Answer: C

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Answer Option 7:

Final Answer: C

****

Answer Option 8:

Final Answer: C

****

Answer Option 9:

Final Answer: C

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Question 8:

'Which of the following statements describe(s) properties of a purely segmented memory system?

I. It divides memory into units of equal size.

II. It permits implementation of virtual memory.

III. It suffers from internal fragmentation.', A. 'I only', B. 'II only', C. 'III only', D. 'I and III'

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Answer Option 1:

Final Answer: B

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Answer Option 2:

Final Answer: B

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Answer Option 3:

Final Answer: B

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Answer Option 4:

Final Answer: B

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Answer Option 5:

Final Answer: B

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Answer Option 6:

Final Answer: B

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Answer Option 7:

Final Answer: B

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Answer Option 8:

Final Answer: B

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Answer Option 9:

Final Answer: B

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Question 9:

'Which of the following statements about floating-point arithmetic is NOT true?', A. 'It is inherently nonassociative because some numbers have no exact representation.', B. 'It is inherently nonassociative because there have to be upper and lower bounds on the size of numbers.', C. 'Associativity can be achieved with appropriate roundoff conventions.', D. 'Some rational numbers have no exact representation.'

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Answer Option 1:

Final Answer: C

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Answer Option 2:

Final Answer: C

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Answer Option 3:

Final Answer: C

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Answer Option 4:

Final Answer: C

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Answer Option 5:

Final Answer: C

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Answer Option 6:

Final Answer: C

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Answer Option 7:

Final Answer: C

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Answer Option 8:

Final Answer: C

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Answer Option 9:

Final Answer: C

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Question 10:

'Suppose sharing of tiles in a multilevel directory structure is achieved with directory entries that are links pointing to a node containing information about a shared file. Information in this node includes (1) the owner of the file, (2) a count of the number of links to the tile, and (3) the disk block numbers of the file. What is a primary drawback to this approach to sharing?', A. 'If the owner modifies the file, another user who does not share will see the changes.', B. 'If the owner renames the file, other users will not be able to access it.', C. 'If the owner is allowed to delete a file, dangling links may result.', D. 'If any user who shares the file appends to it, others who share it will not be able to access the new disk blocks.'

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Answer Option 1:

Final Answer: C

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Answer Option 2:

Final Answer: C

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Answer Option 3:

Final Answer: C

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Answer Option 4:

Final Answer: C

****

Answer Option 5:

Final Answer: C

****

Answer Option 6:

Final Answer: C

****

Answer Option 7:

Final Answer: C

****

Answer Option 8:

Final Answer: C

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Answer Option 9:

Final Answer: C

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Question 11:

'Mergesort works by splitting a list of n numbers in half, sorting each half recursively, and merging the two halves. Which of the following data structures will allow mergesort to work in O(n log n) time?

I. A singly linked list

II. A doubly linked list

III. An array', A. 'nan', B. 'III only', C. 'I and II only', D. 'I, II, and III'

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Answer Option 1:

Final Answer: B

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Answer Option 2:

Final Answer: D

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Answer Option 3:

Final Answer: D

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Answer Option 4:

Final Answer: B

****

Answer Option 5:

Final Answer: B

****

Answer Option 6:

Final Answer: B

****

Answer Option 7:

Final Answer: B

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Answer Option 8:

Final Answer: B

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Answer Option 9:

Final Answer: B

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Question 12:

'If p(x) is the minimal-degree interpolating polynomial for the real-valued function f(x) at the n + 1 distinct real numbers x0, ... xn what is the maximum possible degree of p(x)?', A. 'n', B. 'n + 1', C. 'n + 2', D. '2n'

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Answer Option 1:

Final Answer: A

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Answer Option 2:

Final Answer: A

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Answer Option 3:

Final Answer: A

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Answer Option 4:

Final Answer: A

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Answer Option 5:

Final Answer: A

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Answer Option 6:

Final Answer: A

****

Answer Option 7:

Final Answer: A

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Answer Option 8:

Final Answer: A

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Answer Option 9:

Final Answer: A

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Question 13:

'An internal hash table has 5 buckets, numbered 0, 1, 2, 3, 4. Keys are integers, and the hash function h(i) = i mod 5 is used, with linear resolution of collisions (i.e., if bucket h(i) is filled, the buckets h(i) + 1, h(i) + 2, ... are tried successively with all bucket numbers computed modulo 5). If elements with keys 13, 8, 24, 10, and 3 are inserted, m that order, into an initially blank hash table, then the content of the bucket numbered 2 is', A. '3', B. '8', C. '10', D. '13'

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Answer Option 1:

Final Answer: C

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Answer Option 2:

Final Answer: C

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Answer Option 3:

Final Answer: B

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Answer Option 4:

Final Answer: C

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Answer Option 5:

Final Answer: C

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Answer Option 6:

Final Answer: C

****

Answer Option 7:

Final Answer: C

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Answer Option 8:

Final Answer: B

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Answer Option 9:

Final Answer: C

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Question 14:

'TCP protocol is responsible (among other things) for', A. 'Routing packets through the network', B. 'Reliable delivery of packets between directly connected machines', C. 'Reliable delivery of large (multi-packet) messages between machines that are not necessarily directly connected', D. 'Dealing with differences among operating system architectures'

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Answer Option 1:

Final Answer: C

****

Answer Option 2:

Final Answer: C

****

Answer Option 3:

Final Answer: C

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Answer Option 4:

Final Answer: C

****

Answer Option 5:

Final Answer: C

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Answer Option 6:

Final Answer: C

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Answer Option 7:

Final Answer: C

****

Answer Option 8:

Final Answer: C

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Answer Option 9:

Final Answer: C

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Question 15:

'Let A and B be two sets of words (strings) from Σ*, for some alphabet of symbols Σ. Suppose that B is a subset of A. Which of the following statements must always be true of A and B ?

I. If A is finite, then B is finite.

II. If A is regular, then B is regular.

III. If A is context-free, then B is context-free.', A. 'I only', B. 'II only', C. 'III only', D. 'I and II only'

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Answer Option 1:

Final Answer: D

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Answer Option 2:

Final Answer: D

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Answer Option 3:

Final Answer: D

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Answer Option 4:

Final Answer: D

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Answer Option 5:

Final Answer: D

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Answer Option 6:

Final Answer: D

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Answer Option 7:

Final Answer: D

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Answer Option 8:

Final Answer: D

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Answer Option 9:

Final Answer: D

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Question 16:

'For all strings x, the function x^M is defined recursively as follows.

e^M= e, and

if w is a string and a is a string with length 1, then

(aw)^M = aw^Ma.

Let a be a string with length 1, and let x and y be arbitrary strings. Which of the following is true?', A. 'a^M = a', B. '(ax)^M = (xa)^M', C. '(xy)^M = y^Mx^M', D. 'None of the above'

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Answer Option 1:

Final Answer: A

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Answer Option 2:

Final Answer: C

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Answer Option 3:

Final Answer: A

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Answer Option 4:

Final Answer: A

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Answer Option 5:

Final Answer: A

****

Answer Option 6:

Final Answer: A

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Answer Option 7:

Final Answer: A

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Answer Option 8:

Final Answer: C

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Answer Option 9:

Final Answer: C

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Question 17:

'Which of the following is NOT a reasonable justification for choosing to busy-wait on an asynchronous event?', A. 'The wait is expected to be short.', B. 'A busy-wait loop is easier to code than an interrupt handler.', C. 'There is no other work for the processor to do.', D. 'The program executes on a time-sharing system.'

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Answer Option 1:

Final Answer: D

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Answer Option 2:

Final Answer: D

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Answer Option 3:

Final Answer: D

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Answer Option 4:

Final Answer: D

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Answer Option 5:

Final Answer: D

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Answer Option 6:

Final Answer: D

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Answer Option 7:

Final Answer: D

****

Answer Option 8:

Final Answer: D

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Answer Option 9:

Final Answer: D

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Question 18:

'The language {ww | w in (0 + 1)*} is', A. 'not accepted by any Turing machine', B. 'accepted by some Turing machine, but by no pushdown automaton', C. 'accepted by some pushdown automaton, but not context-free', D. 'context-free, but not regular'

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Answer Option 1:

Final Answer: B

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Answer Option 2:

Final Answer: B

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Answer Option 3:

Final Answer: B

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Answer Option 4:

Final Answer: B

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Answer Option 5:

Final Answer: B

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Answer Option 6:

Final Answer: B

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Answer Option 7:

Final Answer: B

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Answer Option 8:

Final Answer: B

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Answer Option 9:

Final Answer: B

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Question 19:

'Which of the following statements about Ethernets is typically FALSE?', A. 'Ethernets use circuit switching to send messages.', B. 'Ethernets use buses with multiple masters.', C. 'Ethernet protocols use a collision-detection method to ensure that messages are transmitted properly.', D. 'Networks connected by Ethernets are limited in length to a few hundred meters.'

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Answer Option 1:

Final Answer: A

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Answer Option 2:

Final Answer: A

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Answer Option 3:

Final Answer: A

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Answer Option 4:

Final Answer: A

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Answer Option 5:

Final Answer: A

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Answer Option 6:

Final Answer: A

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Answer Option 7:

Final Answer: A

****

Answer Option 8:

Final Answer: A

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Answer Option 9:

Final Answer: A

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Question 20:

'Let P be a procedure that for some inputs calls itself (i.e., is recursive). If P is guaranteed to terminate, which of the following statements must be true?

I. P has a local variable.

II. P has an execution path where it does not call itself.

III. P either refers to a global variable or has at least one parameter.', A. 'I only', B. 'II only', C. 'I and II only', D. 'II and III only'

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Answer Option 1:

Final Answer: D

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Answer Option 2:

Final Answer: D

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Answer Option 3:

Final Answer: D

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Answer Option 4:

Final Answer: B

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Answer Option 5:

Final Answer: B

****

Answer Option 6:

Final Answer: D

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Answer Option 7:

Final Answer: B

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Answer Option 8:

Final Answer: D

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Answer Option 9:

Final Answer: B

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Question 21:

'Which of the following comes closest to being a perfectly secure encryption scheme?', A. 'The Caesar Cipher, a substitution cipher', B. 'DES (Data Encryption Standard), a symmetric-key algorithm', C. 'Enigma, a transposition cipher', D. 'One-time pad'

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Answer Option 1:

Final Answer: D

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Answer Option 2:

Final Answer: D

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Answer Option 3:

Final Answer: D

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Answer Option 4:

Final Answer: D

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Answer Option 5:

Final Answer: D

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Answer Option 6:

Final Answer: D

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Answer Option 7:

Final Answer: D

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Answer Option 8:

Final Answer: D

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Answer Option 9:

Final Answer: D

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Question 22:

'Of the following problems concerning a given undirected graph G, which is currently known to be solvable in polynomial time?', A. 'Finding a longest simple cycle in G', B. 'Finding a shortest cycle in G', C. 'Finding ALL spanning trees of G', D. 'Finding a largest clique in G'

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Answer Option 1:

Final Answer: B

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Answer Option 2:

Final Answer: B

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Answer Option 3:

Final Answer: B

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Answer Option 4:

Final Answer: B

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Answer Option 5:

Final Answer: B

****

Answer Option 6:

Final Answer: B

****

Answer Option 7:

Final Answer: B

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Answer Option 8:

Final Answer: B

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Answer Option 9:

Final Answer: B

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Question 23:

'The IP protocol is primarily concerned with', A. 'Routing packets through the network', B. 'Reliable delivery of packets between directly connected machines', C. 'Reliable delivery of large (multi-packet) messages between machines that are not necessarily directly connected', D. 'Dealing with differences among operating system architectures'

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Answer Option 1:

Final Answer: A

****

Answer Option 2:

Final Answer: A

****

Answer Option 3:

Final Answer: A

****

Answer Option 4:

Final Answer: A

****

Answer Option 5:

Final Answer: A

****

Answer Option 6:

Final Answer: A

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Answer Option 7:

Final Answer: A

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Answer Option 8:

Final Answer: A

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Answer Option 9:

Final Answer: A

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Question 24:

'Of the following, which best approximates the ratio of the number of nonterminal nodes to the total number of nodes in a complete K-ary tree of depth N?', A. '1/K', B. 'K-1/K', C. 'log_10 (1/N)', D. 'N-1/m'

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Answer Option 1:

Final Answer: B

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Answer Option 2:

Final Answer: B

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Answer Option 3:

Final Answer: B

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Answer Option 4:

Final Answer: B

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Answer Option 5:

Final Answer: B

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Answer Option 6:

Final Answer: B

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Answer Option 7:

Final Answer: B

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Answer Option 8:

Final Answer: B

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Answer Option 9:

Final Answer: B

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Question 25:

'Consider a computer system in which processes can request and release one or more resources. Once a process has been granted a resource, the process has exclusive use of that resource until it is released. If a process requests a resource that is already in use, the process enters a queue for that resource, waiting until the resource is available. Which of the following will NOT deal effectively with the problem of deadlock?', A. 'Giving priorities to processes and ordering the wait queues by priority', B. 'Having a process request all its required resources when it first begins, and restarting if it cannot obtain them all', C. 'Numbering the resources and requiring that processes request resources in order of increasing number', D. 'Having processes time out and restart after a random interval of waiting'

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Answer Option 1:

Final Answer: A

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Answer Option 2:

Final Answer: A

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Answer Option 3:

Final Answer: A

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Answer Option 4:

Final Answer: A

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Answer Option 5:

Final Answer: A

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Answer Option 6:

Final Answer: A

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Answer Option 7:

Final Answer: A

****

Answer Option 8:

Final Answer: A

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Answer Option 9:

Final Answer: A

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Question 26:

"'Magic memory"' has two operations: Read and Clear. Both are indivisible and mutually exclusive. Clear sets the magic memory to zero. Read returns a value that represents the number of Read operations since the last Clear operation. Which of the following is (are) true of "Magic memory"?

I. It can provide the functionality of an atomic Test-and-Set.

II. It can be used to coordinate processes running on a shared-memory multiprocessor.

III. It is only useful on a multiprocessor.', A. 'I only', B. 'II only', C. 'III only', D. 'I and II'

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Answer Option 1:

Final Answer: D

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Answer Option 2:

Final Answer: D

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Answer Option 3:

Final Answer: D

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Answer Option 4:

Final Answer: D

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Answer Option 5:

Final Answer: D

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Answer Option 6:

Final Answer: D

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Answer Option 7:

Final Answer: D

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Answer Option 8:

Final Answer: D

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Answer Option 9:

Final Answer: D

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Question 27:

'Which of the following is the name of the data structure in a compiler that is responsible for managing information about variables and their attributes?', A. 'Abstract Syntax Tree (AST)', B. 'Attribute Grammar', C. 'Symbol Table', D. 'Semantic Stack'

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Answer Option 1:

Final Answer: C

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Answer Option 2:

Final Answer: C

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Answer Option 3:

Final Answer: C

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Answer Option 4:

Final Answer: C

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Answer Option 5:

Final Answer: C

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Answer Option 6:

Final Answer: C

****

Answer Option 7:

Final Answer: C

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Answer Option 8:

Final Answer: C

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Answer Option 9:

Final Answer: C

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Question 28:

'Which of the following algorithms has running time Θ(n^2) in the worst case but Θ(n log n) on average?', A. 'Bubblesort', B. 'Mergesort', C. 'Heapsort', D. 'Quicksort'

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Answer Option 1:

Final Answer: D

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Answer Option 2:

Final Answer: D

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Answer Option 3:

Final Answer: D

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Answer Option 4:

Final Answer: D

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Answer Option 5:

Final Answer: D

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Answer Option 6:

Final Answer: D

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Answer Option 7:

Final Answer: D

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Answer Option 8:

Final Answer: D

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Answer Option 9:

Final Answer: D

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Question 29:

'Languages with a structure that implements abstract data types (e.g., a C++ class) can prevent access to components of this structure by all operations except those that are part of this structure. However, definitions of such a structure often contain declarations of components of the structure (e.g., the header file for a C++ class may contain declarations of its private components). For such a language, an object's name could be bound at run time to stack storage for its component values (direct representation) or to a stack pointer referencing heap storage for its component values (indirect representation). Which of the following statements about comparisons between direct and indirect representations is (are) true?

I. Indirect representation noticeably increases compilation time.

II. Direct representation decreases the time needed to access components of a variable.

III. When the storage size of some private component of a variable changes, indirect representation minimizes the number of recompilations of source modules that must be performed.', A. 'I only', B. 'III only', C. 'I and II only', D. 'II and III only'

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Answer Option 1:

Final Answer: D

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Answer Option 2:

Final Answer: D

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Answer Option 3:

Final Answer: D

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Answer Option 4:

Final Answer: D

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Answer Option 5:

Final Answer: D

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Answer Option 6:

Final Answer: D

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Answer Option 7:

Final Answer: D

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Answer Option 8:

Final Answer: D

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Answer Option 9:

Final Answer: D

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Question 30:

'Which of the following is NOT a property of bitmap graphics?', A. 'Fast hardware exists to move blocks of pixels efficiently.', B. 'Realistic lighting and shading can be done.', C. 'All line segments can be displayed as straight.', D. 'Polygons can be filled with solid colors and textures.'

==========

Answer Option 1:

Final Answer: C

****

Answer Option 2:

Final Answer: C

****

Answer Option 3:

Final Answer: C

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Answer Option 4:

Final Answer: C

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Answer Option 5:

Final Answer: C

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Answer Option 6:

Final Answer: C

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Answer Option 7:

Final Answer: C

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Answer Option 8:

Final Answer: C

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Answer Option 9:

Final Answer: C

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Question 31:

'Which of the following is true of interrupts?', A. 'They are generated when memory cycles are "stolen".', B. 'They are used in place of data channels.', C. 'They can indicate completion of an I/O operation.', D. 'They cannot be generated by arithmetic operations.'

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Answer Option 1:

Final Answer: C

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Answer Option 2:

Final Answer: C

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Answer Option 3:

Final Answer: C

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Answer Option 4:

Final Answer: C

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Answer Option 5:

Final Answer: C

****

Answer Option 6:

Final Answer: C

****

Answer Option 7:

Final Answer: C

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Answer Option 8:

Final Answer: C

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Answer Option 9:

Final Answer: C

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Question 32:

'In a height-balanced binary search tree, the heights of the left and right descendents of any node differ by at most 1. Which of the following are true of such a tree?

I. Worst-case search time is logarithmic in the number of nodes.

II. Average-case search time is logarithmic in the number of nodes.

III. Best-case search time is proportional to the height of the tree.

IV. The height of the tree is logarithmic in the number of nodes.', A. 'I and III only', B. 'II and III only', C. 'II and IV only', D. 'I, II, and IV'

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Answer Option 1:

Final Answer: D

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Answer Option 2:

Final Answer: D

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Answer Option 3:

Final Answer: D

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Answer Option 4:

Final Answer: D

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Answer Option 5:

Final Answer: D

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Answer Option 6:

Final Answer: D

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Answer Option 7:

Final Answer: D

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Answer Option 8:

Final Answer: D

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Answer Option 9:

Final Answer: D

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Question 33:

'Bob writes down a number between 1 and 1,000. Mary must identify that number by asking "yes/no" questions of Bob. Mary knows that Bob always tells the truth. If Mary uses an optimal strategy, then she will determine the answer at the end of exactly how many questions in the worst case?', A. '1,000', B. '999', C. '500', D. '10'

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Answer Option 1:

Final Answer: D

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Answer Option 2:

Final Answer: D

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Answer Option 3:

Final Answer: D

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Answer Option 4:

Final Answer: D

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Answer Option 5:

Final Answer: D

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Answer Option 6:

Final Answer: D

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Answer Option 7:

Final Answer: D

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Answer Option 8:

Final Answer: D

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Answer Option 9:

Final Answer: D

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Question 34:

'Which of the following is (are) true about virtual memory systems that use pages?

I. The virtual address space can be larger than the amount of physical memory.

II. Programs must be resident in main memory throughout their execution.

III. Pages correspond to semantic characteristics of the program.', A. 'I only', B. 'II only', C. 'I and II', D. 'I and III'

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Answer Option 1:

Final Answer: A

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Answer Option 2:

Final Answer: A

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Answer Option 3:

Final Answer: A

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Answer Option 4:

Final Answer: A

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Answer Option 5:

Final Answer: A

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Answer Option 6:

Final Answer: A

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Answer Option 7:

Final Answer: A

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Answer Option 8:

Final Answer: A

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Answer Option 9:

Final Answer: A

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Question 35:

'Which of the following is usually NOT represented in a subroutine's activation record frame for a stack-based programming language?', A. 'Values of local variables', B. 'A heap area', C. 'The return address', D. 'Stack pointer for the calling activation record'

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Answer Option 1:

Final Answer: B

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Answer Option 2:

Final Answer: B

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Answer Option 3:

Final Answer: B

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Answer Option 4:

Final Answer: B

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Answer Option 5:

Final Answer: B

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Answer Option 6:

Final Answer: B

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Answer Option 7:

Final Answer: B

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Answer Option 8:

Final Answer: B

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Answer Option 9:

Final Answer: B

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Question 36:

'Which of the following statements about a remote procedure call is true?', A. 'It is used to call procedures with addresses that are farther than 2^16 bytes away.', B. 'It cannot return a value.', C. 'It cannot pass parameters by reference.', D. 'It cannot call procedures implemented in a different language.'

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Answer Option 1:

Final Answer: C

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Answer Option 2:

Final Answer: C

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Answer Option 3:

Final Answer: C

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Answer Option 4:

Final Answer: C

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Answer Option 5:

Final Answer: C

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Answer Option 6:

Final Answer: C

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Answer Option 7:

Final Answer: C

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Answer Option 8:

Final Answer: C

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Answer Option 9:

Final Answer: C

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Question 37:

'Of the following sorting algorithms, which has a running time that is LEAST dependent on the initial ordering of the input?', A. 'Insertion sort', B. 'Quicksort', C. 'Merge sort', D. 'Selection sort'

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Answer Option 1:

Final Answer: C

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Answer Option 2:

Final Answer: C

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Answer Option 3:

Final Answer: C

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Answer Option 4:

Final Answer: C

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Answer Option 5:

Final Answer: C

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Answer Option 6:

Final Answer: C

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Answer Option 7:

Final Answer: C

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Answer Option 8:

Final Answer: C

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Answer Option 9:

Final Answer: C

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Question 38:

'A particular parallel program computation requires 100 seconds when executed on a single processor. If 40 percent of this computation is "inherently sequential" (i.e., will not benefit from additional processors), then the theoretically best possible elapsed times for this program running with 2 and 4 processors, respectively, are', A. '20 and 10 seconds', B. '30 and 15 seconds', C. '50 and 25 seconds', D. '70 and 55 seconds'

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Answer Option 1:

Final Answer: C

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Answer Option 2:

Final Answer: C

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Answer Option 3:

Final Answer: C

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Answer Option 4:

Final Answer: C

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Answer Option 5:

Final Answer: C

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Answer Option 6:

Final Answer: C

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Answer Option 7:

Final Answer: C

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Answer Option 8:

Final Answer: C

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Answer Option 9:

Final Answer: C

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Question 39:

'Consider the representation of six-bit numbers by two's complement, one's complement, or by sign and magnitude. In which representation is there overflow from the addition of the integers 011000 and 011000?', A. 'Two's complement only', B. 'Sign and magnitude and one's complement only', C. 'Two's complement and one's complement only', D. 'All three representations'

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Answer Option 1:

Final Answer: D

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Answer Option 2:

Final Answer: C

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Answer Option 3:

Final Answer: C

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Answer Option 4:

Final Answer: C

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Answer Option 5:

Final Answer: A

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Answer Option 6:

Final Answer: C

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Answer Option 7:

Final Answer: C

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Answer Option 8:

Final Answer: A

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Answer Option 9:

Final Answer: C

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Question 40:

'Of the following, which best characterizes computers that use memory-mapped I/O?', A. 'The computer provides special instructions for manipulating I/O ports.', B. 'I/O ports are placed at addresses on the bus and are accessed just like other memory locations.', C. 'To perform an I/O operation, it is sufficient to place the data in an address register and call the channel to perform the operation.', D. 'Ports are referenced only by memory-mapped instructions of the computer and are located at hardwired memory locations.'

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Answer Option 1:

Final Answer: B

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Answer Option 2:

Final Answer: B

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Answer Option 3:

Final Answer: B

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Answer Option 4:

Final Answer: B

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Answer Option 5:

Final Answer: B

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Answer Option 6:

Final Answer: B

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Answer Option 7:

Final Answer: B

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Answer Option 8:

Final Answer: B

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Answer Option 9:

Final Answer: B

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Question 41:

'Many cryptographic protocols base their security on assumptions about the computational difficulty of integer factorization. Integer factorization serves this purpose because we believe that', A. 'integer multiplication is a function whose inverse, factorization, remains difficult for a large class of inputs', B. 'P = NP', C. 'even if P = NP, integer factorization is still likely not to be polynomial-time computable', D. 'testing primality is computationally intractable'

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Answer Option 1:

Final Answer: A

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Answer Option 2:

Final Answer: A

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Answer Option 3:

Final Answer: A

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Answer Option 4:

Final Answer: A

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Answer Option 5:

Final Answer: A

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Answer Option 6:

Final Answer: A

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Answer Option 7:

Final Answer: A

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Answer Option 8:

Final Answer: A

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Answer Option 9:

Final Answer: A

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Question 42:

'Which of the following sets of bit strings CANNOT be described with a regular expression?', A. 'All bit strings whose number of zeros is a multiple of five', B. 'All bit strings starting with a zero and ending with a one', C. 'All bit strings with an even number of zeros', D. 'All bit strings with more ones than zeros'

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Answer Option 1:

Final Answer: D

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Answer Option 2:

Final Answer: D

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Answer Option 3:

Final Answer: D

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Answer Option 4:

Final Answer: D

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Answer Option 5:

Final Answer: D

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Answer Option 6:

Final Answer: D

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Answer Option 7:

Final Answer: D

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Answer Option 8:

Final Answer: D

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Answer Option 9:

Final Answer: D

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Question 43:

'Which of the following conditions can be expressed by a Boolean formula in the Boolean variables p_1, p_2, p_3, p_4 and the connectives $\wedge$,$\vee$ (without $\neg$)?

I. At least three of p_1, p_2, p_3, p_4 are true.

II. Exactly three of p_1, p_2, p_3, p_4 are true.

III. An even number of p_1, p_2, p_3, p_4 are true.', A. 'I only', B. 'II only', C. 'III only', D. 'I and III'

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Answer Option 1:

Final Answer: A

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Answer Option 2:

Final Answer: A

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Answer Option 3:

Final Answer: D

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Answer Option 4:

Final Answer: A

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Answer Option 5:

Final Answer: A

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Answer Option 6:

Final Answer: A

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Answer Option 7:

Final Answer: D

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Answer Option 8:

Final Answer: A

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Answer Option 9:

Final Answer: A

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Question 44:

'Two alternatives for interconnecting a set of processors with bidirectional links are (1) the fully interconnected network, in which each processor is directly connected to every other processor, and (2) the ring network, in which each processor is connected to two other processors. The worst-case path length for a network is the maximum, over all pairs of nodes in the network, of the minimum length paths (measured in number of links) between the nodes. For each type of interconnection of n processors, a figure of merit can be formed as the product of the number of links required for the network times the worst-case path length connecting any two processors. The ratio of this figure of merit for the fully interconnected network compared to that of the ring network, for even n > 2, is', A. '1/(n^2)', B. '1/(n(n-1))', C. '1/n', D. '(n-1)/n'

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Answer Option 1:

Final Answer: C

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Answer Option 2:

Final Answer: C

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Answer Option 3:

Final Answer: A

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Answer Option 4:

Final Answer: D

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Answer Option 5:

Final Answer: D

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Answer Option 6:

Final Answer: D

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Answer Option 7:

Final Answer: C

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Answer Option 8:

Final Answer: C

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Answer Option 9:

Final Answer: C

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Question 45:

'For a connected, undirected graph G = (V, E), which of the following must be true?

I. $\Sigma_{v \in V}$ degree(v) is even.

II. $|E| \geq |V| - 1$

III. G has at least one vertex with degree 1.', A. 'I only', B. 'II only', C. 'III only', D. 'I and II'

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Answer Option 1:

Final Answer: D

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Answer Option 2:

Final Answer: D

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Answer Option 3:

Final Answer: D

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Answer Option 4:

Final Answer: D

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Answer Option 5:

Final Answer: D

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Answer Option 6:

Final Answer: D

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Answer Option 7:

Final Answer: D

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Answer Option 8:

Final Answer: D

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Answer Option 9:

Final Answer: D

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Question 46:

'In multiprogrammed systems it is advantageous if some programs such as editors and compilers can be shared by several users. Which of the following must be true of multiprogrammed systems in order that a single copy of a program can be shared by several users?

I. The program is a macro.

II. The program is recursive.

III. The program is reentrant.', A. 'I only', B. 'II only', C. 'III only', D. 'II and III only'

==========

Answer Option 1:

Final Answer: C

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Answer Option 2:

Final Answer: C

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Answer Option 3:

Final Answer: C

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Answer Option 4:

Final Answer: C

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Answer Option 5:

Final Answer: C

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Answer Option 6:

Final Answer: C

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Answer Option 7:

Final Answer: C

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Answer Option 8:

Final Answer: C

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Answer Option 9:

Final Answer: C

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Question 47:

'Which of the following decimal numbers has an exact representation in binary notation?', A. '0.1', B. '0.2', C. '0.3', D. '0.5'

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Answer Option 1:

Final Answer: D

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Answer Option 2:

Final Answer: D

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Answer Option 3:

Final Answer: D

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Answer Option 4:

Final Answer: D

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Answer Option 5:

Final Answer: D

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Answer Option 6:

Final Answer: D

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Answer Option 7:

Final Answer: D

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Answer Option 8:

Final Answer: D

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Answer Option 9:

Final Answer: D

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Question 48:

'Function signatures describe the types of the arguments to a function as well as the return value of the function. For instance, the addition function on reals has a signature of

add : real x real -> real

since it takes two real numbers and returns a real number. But, for a language that allows functions as return values, addition could be considered to have the signature

add : real -> (real -> real)

which means that add takes a single real (the first operand) and returns a new function that itself takes a single real (the second operand) and returns a real (the result). This process of reducing a function with multiple arguments to a function with fewer arguments is called currying. Which of the following is correct?', A. 'Currying can be applied to any function to the point where it has exactly one input argument.', B. 'Currying cannot be applied to functions of more than two arguments.', C. 'Currying cannot be applied to functions that return functions as arguments.', D. 'Currying cannot be applied w functions that haw arguments that are functions.'

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Answer Option 1:

Final Answer: A

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Answer Option 2:

Final Answer: A

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Answer Option 3:

Final Answer: A

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Answer Option 4:

Final Answer: A

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Answer Option 5:

Final Answer: A

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Answer Option 6:

Final Answer: A

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Answer Option 7:

Final Answer: A

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Answer Option 8:

Final Answer: A

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Answer Option 9:

Final Answer: A

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Question 49:

'Array A contains 256 elements of 4 bytes each. Its first element is stored at physical address 4,096.

Array B contains 512 elements of 4 bytes each. Its first element is stored at physical address 8,192.

Assume that only arrays A and B can be cached in an initially empty, physically addressed, physically tagged, direct-mapped, 2K-byte cache with an 8-byte block size. The following loop is then executed.

for (i = 0; i < 256; i++)

A[i] = A[i] + B[2*i];

During the execution of the loop, how many bytes will be written to memory if the cache has a write-back policy?', A. '0', B. '256', C. '1024', D. '2000'

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Answer Option 1:

Final Answer: C

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Answer Option 2:

Final Answer: C

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Answer Option 3:

Final Answer: A

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Answer Option 4:

Final Answer: A

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Answer Option 5:

Final Answer: A

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Answer Option 6:

Final Answer: C

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Answer Option 7:

Final Answer: C

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Answer Option 8:

Final Answer: C

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Answer Option 9:

Final Answer: A

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Question 50:

'In which of the following representations of numbers by 8-bit words is the addition of the integers 109 and -42 within range?

I. One's complement

II. Two's complement

III. Sign and magnitude', A. 'I only', B. 'II only', C. 'I and II only', D. 'I, II, and III'

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Answer Option 1:

Final Answer: B

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Answer Option 2:

Final Answer: B

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Answer Option 3:

Final Answer: B

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Answer Option 4:

Final Answer: B

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Answer Option 5:

Final Answer: C

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Answer Option 6:

Final Answer: B

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Answer Option 7:

Final Answer: B

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Answer Option 8:

Final Answer: B

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Answer Option 9:

Final Answer: B

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