

Summary in Graph

Exam Summary (GO Classes Test Series 2024 | Mock GATE | Test 14).

Qs. Attempted:	56 25 + 31	Correct Marks:	67 21 + 46
Correct Attempts:	44 21 + 23	Penalty Marks:	2 0.67 + 1.33
Incorrect Attempts:	12 4 + 8	Resultant Marks:	65 20.33 + 44.66

Total Questions:	65 30 + 35
Total Marks:	100 30 + 70
Exam Duration:	180 Minutes
Time Taken:	180 Minutes

- EXAM RESPONSE
- EXAM STATS
- FEEDBACK

Aptitude

Q #1

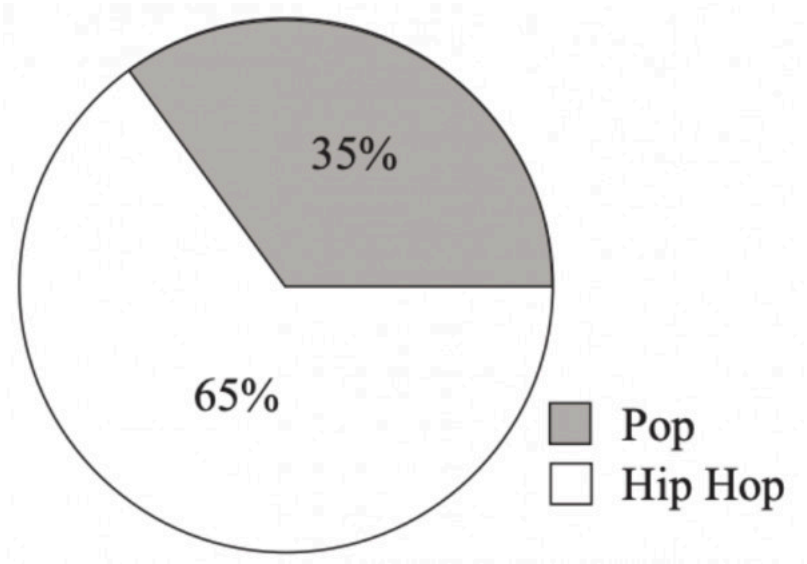
Multiple Choice Type

Award: 1

Penalty: 0.33

Quantitative Aptitude

The graph shows styles of music on a playlist. Country music songs are added to the playlist so that now 40% of the songs are Country. If the ratio of Hip Hop songs to Pop songs remains the same, what percentage of the total number of songs are now Hip Hop?



- A. 7
- B. 21
- C. 35
- D. 39

Your Answer: D

Correct Answer: D

Correct

Discuss

Q #2

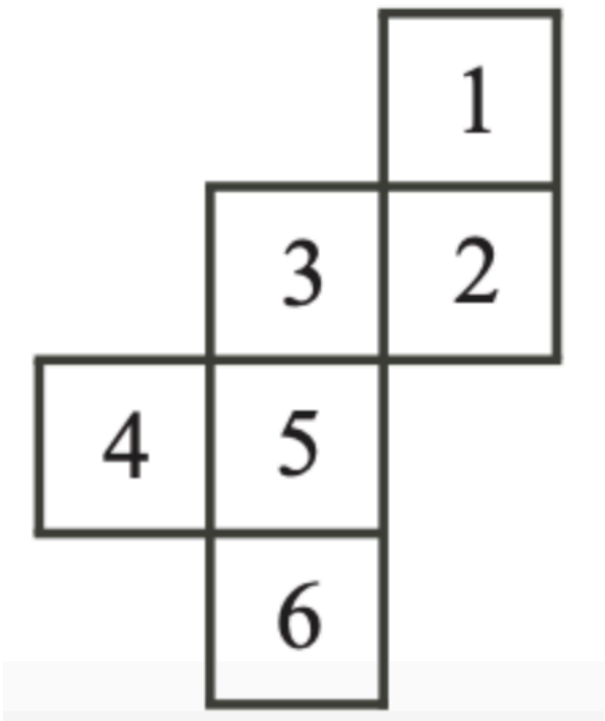
Multiple Choice Type

Award: 1

Penalty: 0.33

Spatial Aptitude

The numbered net shown is folded to form a cube. What is the product of the numbers on the four faces sharing an edge with the face numbered 1?



- A. 120
- B. 144
- C. 180
- D. 240

Your Answer: B

Correct Answer: B

Correct

Discuss

Q #3

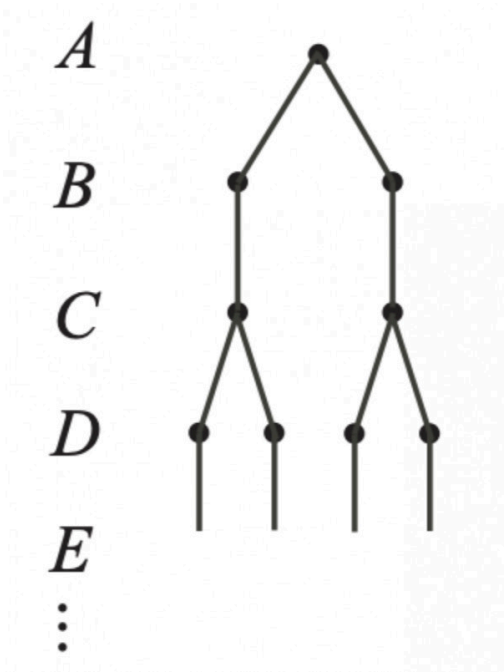
Multiple Choice Type

Award: 1

Penalty: 0.33

Analytical Aptitude

In the diagram, there are 26 levels, labelled A, B, C, . . . , Z. There is one dot on level A. Each of levels B, D, F, H, J, . . . , and Z contains twice as many dots as the level immediately above. Each of levels C, E, G, I, K, . . . , and Y contains the same number of dots as the level immediately above. How many dots does level Z contain?



- A. 2048
- B. 4096
- C. 8192
- D. 16384

Your Answer: C

Correct Answer: C

Correct

Discuss

Q #4

Multiple Choice Type

Award: 1

Penalty: 0.33

Verbal Aptitude

Choose the most appropriate alternative from the options given below to complete the following sentence:
Mistakes involving wrong posting are called as errors of _____.

- A. Compensating
- B. Omission
- C. Principle
- D. Posting clerical error

Your Answer: D

Correct Answer: D

Correct

Discuss

Q #5

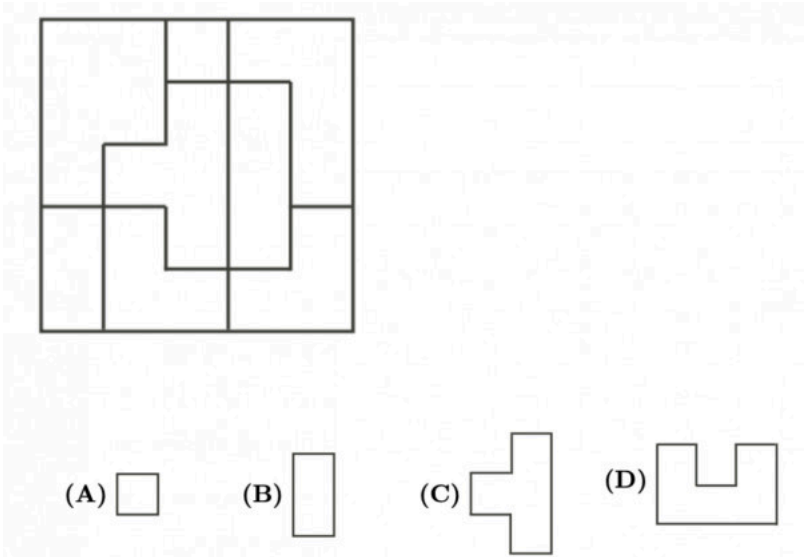
Multiple Choice Type

Award: 1

Penalty: 0.33

Spatial Aptitude

The diagram shows a square divided into eight pieces. Which shape is not one of those pieces?



Your Answer: D

Correct Answer: D

Correct

Discuss

Q #6

Multiple Choice Type

Award: 2

Penalty: 0.67

Verbal Aptitude

Select the grammatically incorrect sentence from the options given.

- A. The case holding the plates are broken.
- B. Either Ravi or Reena is attempting to come today.
- C. Both Ali and Anjana will have to take the test.
- D. The overall sentiment in the office is negative regarding the reports.

Your Answer: A

Correct Answer: A

Correct

Discuss

Q #7

Multiple Choice Type

Award: 2

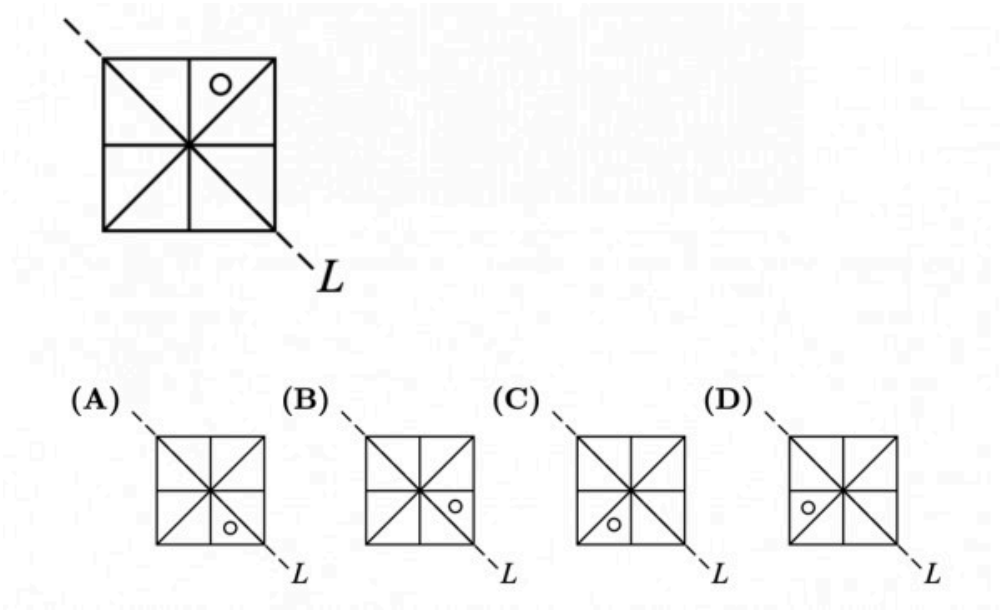
Penalty: 0.67

Analytical Aptitude

A class of 30 students was asked what they did on their winter holiday. 20 students said that they went skating. 9 students said that they went skiing. Exactly 5 students said that they went skating and went skiing. How many students did not go skating and did not go skiing?

- A. 1
- B. 6
- C. 11
- D. 19

Which of the following shows the final position of the figure?

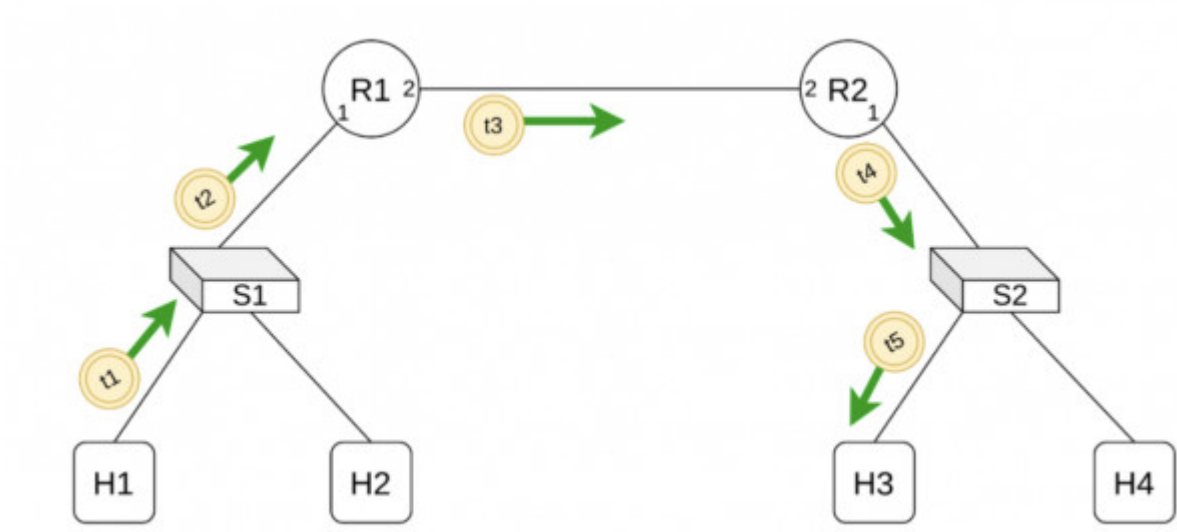


Your Answer: D Correct Answer: D Correct Discuss

Technical

Q #1 Multiple Select Type Award: 1 Penalty: 0 Computer Networks

Consider the following network, which consists of two routers (R1 and R2), two switches (S1 and S2), and four hosts (H1, H2, H3, and H4).



Suppose H1 wants to send packet to H3, which of the following is/are TRUE?

- A. Packet leaving H1 will have destination mac address of S1
- B. Packet leaving S1 will have destination mac address of R1
- C. Packet leaving R1 will have destination mac address of R2
- D. Packet leaving R2 will have destination mac address of S2

Your Answer: Correct Answer: B;C Not Attempted Discuss

Q #2 Multiple Choice Type Award: 1 Penalty: 0.33 Computer Networks

Consider the sender's view of the sequence numbers in Go-Back-N protocol. Suppose the first sequence number in the sender's window is k , and the last sequence number in the sender's window is $k + 3$. Let a packet with sequence number i be p_i . Which of the following MUST be TRUE?

- A. p_k is sent and acknowledge.
- B. p_{k+3} is not sent.
- C. If p_{k+2} is sent, then p_{k+1} must have been sent.
- D. If p_{k+2} is not sent, then p_{k+1} must not have been sent.

Your Answer:

Correct Answer: C

Not Attempted

Discuss

Q #3

Multiple Choice Type

Award: 1

Penalty: 0.33

Databases

Division operator in relational algebra is appropriate to handle which of the following query types?

- A. employees work on at most one of the critical projects
- B. employees work on any one of the critical projects
- C. employees work on at least one of the critical projects
- D. employees work on all the critical projects

Your Answer: D

Correct Answer: D

Correct

Discuss

Q #4

Numerical Type

Award: 1

Penalty: 0

Databases

A B-Tree of order m is an m -way search tree. What is the minimum number of keys that can be stored on the leaf level of a B-Tree of order 20 with 3 levels? (Note: the root of a tree counts as its first level)

Your Answer:

Correct Answer: 180

Not Attempted

Discuss

Q #5

Multiple Select Type

Award: 1

Penalty: 0

Graph Theory

Let G be a simple undirected graph on 8 vertices such that there is a vertex of degree 1 , a vertex of degree 2 , a vertex of degree 3 , a vertex of degree 4, a vertex of degree 5 , a vertex of degree 6 and a vertex of degree 7. Which of the following can be the degree of the last vertex? (Select all that are possible)

- A. 0
- B. 3
- C. 4
- D. 8

Your Answer: C

Correct Answer: C

Correct

Discuss

Q #6

Multiple Choice Type

Award: 1

Penalty: 0.33

Programming in C

Consider the following C code:

```
double A[2][3] = {{1, 2, 3}, {4, 5, 6}};
```

Assume that $A[0] = 0xFFAA0000$ and the `sizeof(double)` is 8.

What will be the value of $A[1]$?

- A. 0xFFAA0024
- B. 0xFFAA0003
- C. 0xFFAA000C
- D. 0xFFAA0018

Your Answer: D

Correct Answer: D

Correct

Discuss

Q #7

Multiple Choice Type

Award: 1

Penalty: 0.33

Algorithms

Consider the following function.

```
f(k)
{
    x = 2;
    for i = 1 to k
        x = x * x;
    return x;
}
```

If n and k are positive integers, then the least value of k such that $f(k) > n$ is approximately

- A. $\log_2(\log_2 n)$
- B. $\log_2 n$
- C. $n \log_2 n$
- D. 2^n

Your Answer: A

Correct Answer: A

Correct

Discuss

Q #8

Multiple Choice Type

Award: 1

Penalty: 0.33

Algorithms

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 that answer at the end of exactly how many questions on the worst case?

- A. 999
- B. 500
- C. 32
- D. 10

Your Answer: C

Correct Answer: D

Incorrect

Discuss

Q #9

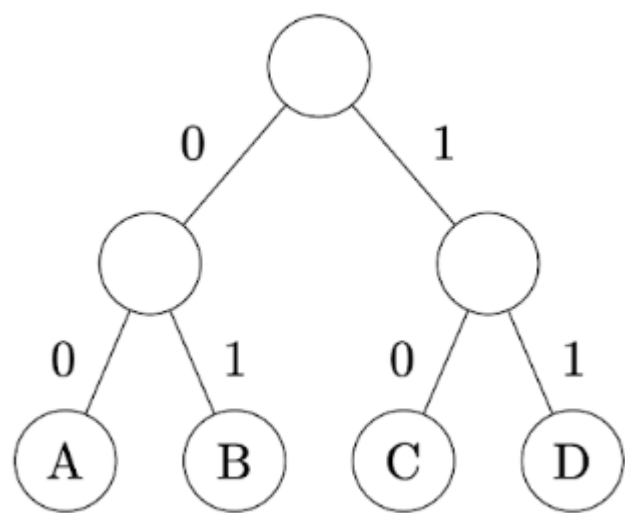
Multiple Select Type

Award: 1

Penalty: 0

Algorithms

Which of the following frequencies for A,B,C and D can generate the following Huffman tree? (Select all that apply.)



- A. $p_A = 0.4, p_B = 0.3, p_C = 0.2, p_D = 0.1$
- B. $p_A = 0.35, p_B = 0.25, p_C = 0.2, p_D = 0.2$
- C. $p_A = 0.25, p_B = 0.25, p_C = 0.25, p_D = 0.25$
- D. $p_A = 0.2, p_B = 0.35, p_C = 0.2, p_D = 0.25$

Your Answer: C

Correct Answer: B;C

Incorrect

Discuss

Q #10

Multiple Select Type

Award: 1

Penalty: 0

Algorithms

Consider the following array: $[32, 33, 5, 2, 14, -4, 22, 39, 34, -9]$.

We apply a certain sorting algorithm and observe that the array has been modified to $[2, 5, 14, 32, 33, -9, -4, 22, 34, 39]$ while the sorting algorithm is in progress (not yet completed).

Which of the following sorting algorithms could we possibly have applied?

- A. Merge sort (top-down approach)
- B. Bubble sort
- C. Quicksort (Using First element as pivot)
- D. Insertion sort

Your Answer: A

Correct Answer: A

Correct

Discuss

Q #11

Multiple Choice Type

Award: 1

Penalty: 0.33

Probability

Suppose we have events A, B in a sample space. And we know that $P(A) = 0.3, P(B \mid A^c) = 0.25, P(B \mid A) = 0.45$.

What is $P(A^c \mid B)$?

- A. 0.75
- B. 0.55
- C. 0.2
- D. 0.56

Your Answer: D

Correct Answer: D

Correct

Discuss

Q #12

Multiple Select Type

Award: 1

Penalty: 0

Linear Algebra

Let A be a 20×11 matrix with real entries. After performing some row operations on A , we get a matrix B which has 12 nonzero rows. Which of the following is/are always true?

- A. The rank of A is 12.
- B. The ranks of A and B are not related.
- C. If v is a vector such that $Av = 0$ then Bv is also 0.
- D. The rank of B is at most 11.

Your Answer: C;D

Correct Answer: C;D

Correct

Discuss

Q #13

Multiple Choice Type

Award: 1

Penalty: 0.33

Operating System

Consider the context switch of a CPU from the context of process P1 to that of process P2.

Consider the following two events in the chronological order of the events during the context switch:

- E1: The stack pointer shifts from pointing to the kernel stack of P1 to the kernel stack of P2;
- E2: The program counter shifts from pointing to an address in the memory allocated to P1 to an address in the memory allocated to P2.

Which of the following statements is/are true regarding the relative ordering of events E1 and E2?

- A. E1 occurs before E2.

- B. E2 occurs before E1.
- C. E1 and E2 occur simultaneously via an atomic hardware instruction.
- D. The relative ordering of E1 and E2 can vary from one context switch to the other.

Your Answer: C Correct Answer: A Incorrect Discuss

Q #14 Multiple Choice Type Award: 1 Penalty: 0.33 Operating System

Consider a job A arrives at time $T = 0$ and job length of 500 ms. Job B arrives at time $T = 100$ ms with a length of 100 ms.
Considering the Shortest Remaining Time First Scheduler, what does the schedule for our CPU look like?

- A. A runs for 500 ms, then B runs for 100 ms
- B. B runs for 100 ms, then A runs for 500 ms
- C. A runs for 100 ms, then B runs for 100 ms, and then A runs again for 400 ms
- D. A runs for 100 ms, then B runs for 100 ms, then A runs for 100 ms, then B runs for 100 ms, then A runs for 300 ms

Your Answer: C Correct Answer: C Correct Discuss

Q #15 Multiple Select Type Award: 1 Penalty: 0 Computer Networks

A host uses a variety of protocols to discover information about the network it is connected to. Which of the following statements are TRUE?

- A. To perform a DNS lookup, a host must first discover the IP address of its local DNS server using DHCP.
- B. To transmit a packet outside the host's subnet, the host must first discover the IP address of its first-hop router using DHCP.
- C. To send a packet to another host outside its subnet, a host must first discover the IP address of the destination host using DNS.
- D. To send a packet to another host in the same subnet, a host must first discover the MAC address of the destination host using ARP.

Your Answer: Correct Answer: A;B;C;D Not Attempted Discuss

Q #16 Multiple Select Type Award: 1 Penalty: 0 Compiler Design

Which attributes in the following grammar are synthesized?

$$\begin{aligned} A &\rightarrow \mathbf{a} B & A.a &:= B.x; & B.b &:= 'a' \\ B &\rightarrow \mathbf{b} C & C.c &:= B.b + 'b'; & B.x &:= C.x \\ C &\rightarrow \mathbf{c} & C.x &:= C.c \end{aligned}$$

- A. $A.a$
- B. $B.b$
- C. $B.x$
- D. $C.c$

Your Answer: A;B;C;D Correct Answer: A;C Incorrect Discuss

Q #17 Multiple Choice Type Award: 1 Penalty: 0.33 Programming in C

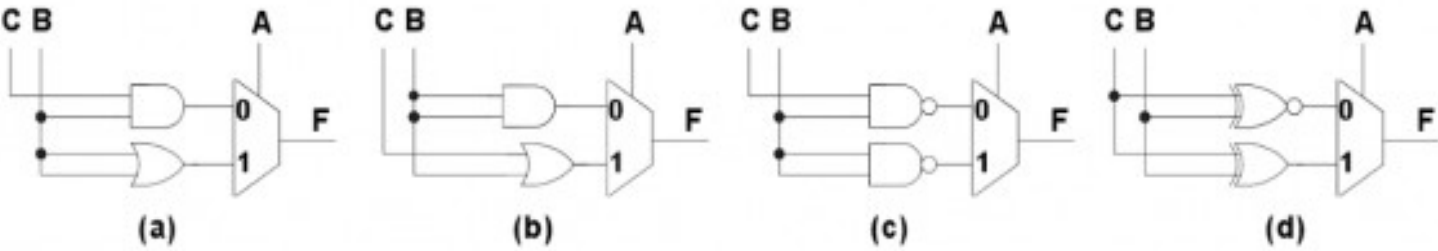
What is a statically allocated variable in C programming?

- A. A variable allocated at an absolute address in a program’s data space
- B. A variable allocated on the stack
- C. A variable allocated on the heap
- D. A variable which can NOT be defined as local variable

Your Answer: A Correct Answer: A Correct Discuss

Q #18 Multiple Choice Type Award: 1 Penalty: 0.33 Digital Logic

Consider function $G(A, B, C) = AB + BC$. Let $F(A, B, C)$ be the dual of $G(A, B, C)$. Then $F(A, B, C)$ can be implemented using **A** as the select (control) input to a 2-to-1 multiplexer. The correct implementation of $F(A, B, C)$ is shown in:



Your Answer: B Correct Answer: B Correct Discuss

Q #19 Multiple Choice Type Award: 1 Penalty: 0.33 Digital Logic

The largest positive number in 2's complement format represented with 8-bits is:

- A. $(FF)_{16}$
- B. $(128)_{10}$
- C. $(777)_8$
- D. $(01111111)_2$

Your Answer: D Correct Answer: D Correct Discuss

Q #20 Multiple Choice Type Award: 1 Penalty: 0.33 Digital Logic

Consider the function $f(x_1, x_2, x_3) = x_1 \cdot x_2 \cdot x_3 + \bar{x}_1 \cdot \bar{x}_2 \cdot \bar{x}_3 + \bar{x}_1 \cdot x_2 \cdot \bar{x}_3 + \bar{x}_1 \cdot x_2 \cdot x_3$, what is the product of sum(POS) expression for this function?

- A. $f(x_1, x_2, x_3) = (x_1 + x_2 + x_3) \cdot (\bar{x}_1 + \bar{x}_2 + \bar{x}_3) \cdot (\bar{x}_1 + x_2 + \bar{x}_3) \cdot (\bar{x}_1 + x_2 + x_3)$
- B. $f(x_1, x_2, x_3) = (\bar{x}_1 + \bar{x}_2 + \bar{x}_3) \cdot (x_1 + x_2 + x_3) \cdot (x_1 + \bar{x}_2 + x_3) \cdot (x_1 + \bar{x}_2 + \bar{x}_3)$
- C. $f(x_1, x_2, x_3) = (x_1 + x_2 + \bar{x}_3) \cdot (\bar{x}_1 + x_2 + x_3) \cdot (\bar{x}_1 + x_2 + \bar{x}_3) \cdot (\bar{x}_1 + \bar{x}_2 + x_3)$
- D. $f(x_1, x_2, x_3) = (\bar{x}_1 + x_2 + \bar{x}_3) \cdot (\bar{x}_1 + x_2 + x_3) \cdot (x_1 + \bar{x}_2 + \bar{x}_3) \cdot (\bar{x}_1 + \bar{x}_2 + x_3)$

Your Answer: C Correct Answer: C Correct Discuss

Q #21 Multiple Select Type Award: 1 Penalty: 0 Theory of Computation

DeMorgan’s Laws ensure that

- A. Closure under intersection and complementation imply closure under union.
- B. Closure under intersection and union imply closure under complementation.
- C. Closure under union and complementation imply closure under intersection.
- D. Closure under any two of union, intersection, and complementation implies closure under all three.

Your Answer: Correct Answer: A;C Not Attempted Discuss

Q #22 Multiple Choice Type Award: 1 Penalty: 0.33 Theory of Computation

Which of the following sets has the greatest cardinality?

- A. The set of real numbers \mathbb{R}
- B. The set of all functions from \mathbb{R} to $\{0,1\}$
- C. The set of all finite subsets of natural numbers
- D. The set of all finite-length binary strings

Your Answer: B Correct Answer: B Correct Discuss

Q #23 Multiple Choice Type Award: 1 Penalty: 0.33 Programming in C

On a 64-bit system, which of the following C expressions is equivalent to the C expression $(x[2] + 4)[3]$? Assume x is declared as `int **x`

- A. $((*(x + 16)) + 28)$
- B. $((*(x + 2)) + 7)$
- C. $(((*x) + 2) + 7)$
- D. $((** (x + 2) + 7)$

Your Answer: B Correct Answer: B Correct Discuss

Q #24 Multiple Choice Type Award: 1 Penalty: 0.33 DS

Suppose you implement a queue using a singly linked list with head and tail pointers so that the front of the queue is at the tail of the list, and the rear of the queue is at the head of the list.

What is the best possible worst-case running time for enqueue and dequeue in this situation? (As a reminder, enqueue occurs at the rear of the queue.)

- A. $O(1)$ for both functions.
- B. $O(1)$ for enqueue and $O(n)$ for dequeue.
- C. $O(n)$ for enqueue and $O(1)$ for dequeue.
- D. $O(n)$ for both functions.

Your Answer: B Correct Answer: B Correct Discuss

Q #25 Multiple Select Type Award: 1 Penalty: 0 Theory of Computation

Which of the following strings are a member of the language described by the regular expression $(a^*ba^*ba^*ba^*)^*$

- A. *bbbb*
- B. *bbaaabb*

- C. *bbaaabbbabb*
- D. *bbabbbab*

Your Answer: D Correct Answer: D Correct Discuss

Q #26 Multiple Select Type Award: 2 Penalty: 0 Operating System

Assume a linear page table, with a 1-byte page-table entry. Assume physical and virtual address spaces of size 128 bytes with 32-byte pages. The page-table base register is set to physical address 16. The contents of the page table are:

VPN	PFN
0	1
1	Not valid
2	3
3	Not valid

Where VPN is the Virtual Page Number and PFN is the Physical Page Number.

Now, finally assume we have the following instruction, which loads a SINGLE BYTE from virtual address 70 into register R1:

10: LOAD 70, R1

This instruction resides at virtual address 10 within the address space of the process.

What are the physical addresses that will get referred in fetch and execute of the above instruction?

- A. 10
- B. 42
- C. 102
- D. 70

Your Answer: B;D Correct Answer: B;C Incorrect Discuss

Q #27 Multiple Choice Type Award: 2 Penalty: 0.67 Operating System

Suppose that an operating system provides two functions, block() which puts the calling process on the blocked queue, and wakeup(P) which moves process P to the ready queue if it is currently on the blocked queue. wakeup(P) does not perform any action if the process P is NOT in the blocked queue.

Consider two processes A and B running the code given below.

```
void A()
{ while(1) {
    block();
    printf("A");
    wakeup(B);
  }
}
```

```
void B()
{ while(1) {
    printf("B");
    wakeup(A);
    block();
  }
}
```

Which of the following is TRUE regarding the behaviour of the system when we run A and B concurrently on the uni-processor system?

- A. It is possible to have deadlock in the system.
- B. A and B will always run forever with strick alternation printing ABABAB....
- C. A and B will always run forever with strick alternation printing BABABA....

D. None of these

Your Answer: A

Correct Answer: A

Correct

Discuss

Q #28

Multiple Select Type

Award: 2

Penalty: 0

Computer Networks

Consider a sliding window protocol with a window size of 5 using cumulative ACKs (and ACK is being sent for each segment).

Assume that the retransmission timeout timer is long enough and timeout has not occurred for any packet in this question.

The numbering of data packets start from 1. Also, assume the TCP receiver sends an ACK for every segment it receives.

The notation Ax is used to mean that the ACK packet is acknowledging the receipt of all packets up to and including data packet x . That is, $A5$ is acknowledging the receipt of packet 5; to be clear, the notation does not mean that the receiver is expecting packet 5 as the next data packet. Assume that the following ACK packets arrive (just the ordering is shown, no timing information is provided):

$A1A2A3A3A5A6$

Which scenarios would have produced such a series of ACKs? (mark all that apply)

- A. Data packet number 4 was dropped.
- B. Data packet number 4 was delayed, and arrived immediately after data packet 5
- C. Data packet 3 was duplicated by the network
- D. ACK packet A3 was duplicated by the network

Your Answer:

Correct Answer: B

Not Attempted

Discuss

Q #29

Multiple Select Type

Award: 2

Penalty: 0

Set Theory & Algebra

For sets A and B , let $f : A \rightarrow B$ and $g : B \rightarrow A$ be functions such that $f(g(x)) = x$ for each $x \in B$. Which among the following statements is/are correct?

- A. The function f must be one-to-one.
- B. The function f must be onto.
- C. The function g must be one-to-one.
- D. The function g must be onto.

Your Answer: B;C

Correct Answer: B;C

Correct

Discuss

Q #30

Multiple Choice Type

Award: 2

Penalty: 0.67

Databases

Consider the following schema (primary keys are underlined):

Course (cno, cname, deptno, units)
Dept (dname, deptno)

Which of the following queries returns the department numbers of those departments for which there are no courses being offered?

- A) `SELECT D.deptno
FROM Dept D, Course C
WHERE D.deptno NOT EQUAL C.deptno;`
- B) `SELECT C.deptno, COUNT(C.deptno)
FROM Course C
GROUP BY C.deptno
HAVING COUNT (C.Deptno) = NULL;`
- C) `SELECT C.deptno
FROM Course C
WHERE C.deptno NOT IN (SELECT * FROM Dept);`
- D) `SELECT D.deptno
FROM Dept D
WHERE NOT EXISTS (SELECT * FROM Course C
WHERE C.deptno = D.deptno);`

Your Answer: D

Correct Answer: D

Correct

Discuss

Q #31

Multiple Select Type

Award: 2

Penalty: 0

Databases

Consider the following lock requests in the Table below. And note that:

- $S(\cdot)$ and $X(\cdot)$ stand for 'shared lock' and 'exclusive lock', respectively.
- T_1, T_2, T_3, T_4 , and T_5 represent five transactions.
- LM represents a 'lock manager'.
- Transactions will never release a granted lock.

time	t_1	t_2	t_3	t_4	t_5	t_6	t_7	t_8
T_1	$S(A)$		$S(B)$					
T_2		$X(B)$						$X(D)$
T_3				$S(C)$	$X(D)$		$X(A)$	
T_4						$X(C)$		
LM	g	g						

To prevent deadlock, we use the lock manager (LM) that adopts the Wound-Wait policy. We assume that in terms of priority: $T_1 > T_2 > T_3 > T_4$. Here, $T_1 > T_2$ because T_1 is older than T_2 (i.e., older transactions have higher priority). Determine whether the lock request is granted ('g'), blocked (' b '), aborted ('a'), or already dead('-').

Select all that are correct.

- A. At t_3 : a
- B. At t_6 : b
- C. At t_7 : a
- D. At t_8 : -

Your Answer:

Correct Answer: B;D

Not Attempted

Discuss

Q #32

Multiple Select Type

Award: 2

Penalty: 0

Programming in C

The provided C code is a version of the C string library function `strlen()`, which calculates the length of a given string.

```
unsigned int mystrlen(char *c)
{
    unsigned int i = 0;
    /* Your code here. */
}
```

Which line of code creates a working and accurate version of strlen()?

- A.

```
if (*c == '\0') {
    return i;
} else {
    return mystrlen(++c) + 1;
}
```
- B.

```
if (*c == '\0') {
    return i;
} else {
    return mystrlen(c++) + 1;
}
```
- C.

```
while (*(c + i) != '\0') i++;
return i;
```
- D.

```
while (*(c + i) != '\0') ++i;
return i;
```

Your Answer: A;C;D

Correct Answer: A;C;D

Correct

Discuss

Q #33

Numerical Type

Award: 2

Penalty: 0

Programming in C

What will be the output of the following C program?

```
#include <stdio.h>

void Mickey(int**, int, int);

void Mouse(int, int*);

int main()
{
    int a = 2, b = 3, c = 4;

    int *points = &a;

    Mickey(&points, b, c);

    printf("%d", *points);

    return 0;
}

void Mickey(int** points, int x, int y)
{
    int *p = *points;

    int z;

    z = y + x;
```



```
*p = y - x;

*p = **points+1;

Mouse(z, p);

return;

}

void Mouse(int z, int *p)

{

    *p = *p+1;

    return;

}
```

Your Answer: 3

Correct Answer: 3

Correct

Discuss

Q #34

Numerical Type

Award: 2

Penalty: 0

DS

Let B be a binary search tree (BST) with eight nodes filled with the following set of eight integer keys $A = \{10, 2, 5, 3, 20, 15, 9, 22\}$. The order in which these keys were inserted to create B is not known. However, it is known that once the BST is created, $(8 \times 9)/2 = 36$ comparisons are required to verify if all eight keys of A are present in B . How many leaf nodes are present in B ?

Your Answer: 4

Correct Answer: 1

Incorrect

Discuss

Q #35

Numerical Type

Award: 2

Penalty: 0

DS

Consider a stack whose elements are unsigned integers and support the following operations:

- PUSH a: Pushes the element 'a' onto the stack.
- ADD: Adds the two topmost elements, removes them, and pushes the result.
- SQR: Computes the square of the topmost element, removes it, and pushes the result.
- REV: Reverses the order of the three topmost elements in the stack (if the stack contains fewer than three elements, REV is undefined).

Computation starts with an empty stack, and after a sequence of operations, the topmost element is considered the final result. Given three unsigned integers x , y , and z , determine the number of instructions needed in the sequence to compute the following expression:

$$(x + y)^2 + z^2$$

The instruction sequence should start with: PUSH x ; PUSH y ; PUSH z ; . . .

No further PUSH operations are allowed. After the entire sequence of instructions executes, the top of the stack should contain the given expression.

If an instruction is used more than once, count it as many times as it is used. Your final count should include initial 3 PUSH instructions.

Your Answer: 8

Correct Answer: 8

Correct

Discuss

Q #36

Multiple Choice Type

Award: 2

Penalty: 0.67

Algorithms

We have a procedure $P(n)$ that makes multiple calls to a procedure $Q(m)$, and runs in polynomial time in n . Unfortunately, a significant flaw was discovered in $Q(m)$, and it had to be replaced by $R(m)$, which runs in exponential time in m . Thankfully, P is still correct when we replace each call to $Q(m)$ with a call to $R(m)$ instead.

Which of the following can we definitely say about the modified version of P ?

- A. $P(n)$ still runs in polynomial time in n .
- B. $P(n)$ requires exponential time in n .
- C. $P(n)$ runs in polynomial time in n if the number of calls made to Q is proportional to $\log n$.
- D. $P(n)$ runs in polynomial time in n if, for each call $Q(m)$, $m \leq \log n$.

Your Answer: D

Correct Answer: D

Correct

Discuss

Q #37

Multiple Choice Type

Award: 2

Penalty: 0.67

Algorithms

A stable sort preserves the order of values that are equal with respect to the comparison function. We have a list of three-dimensional points $[(7, 1, 8), (3, 5, 7), (6, 1, 4), (6, 5, 9), (0, 2, 5), (9, 0, 9)]$.

We sort these in ascending order by the second coordinate. Which of the following corresponds to a stable sort of this input?

- A. $[(9, 0, 9), (7, 1, 8), (6, 1, 4), (0, 2, 5), (6, 5, 9), (3, 5, 7)]$
- B. $[(0, 2, 5), (3, 5, 7), (6, 1, 4), (6, 5, 9), (7, 1, 8), (9, 0, 9)]$
- C. $[(9, 0, 9), (7, 1, 8), (6, 1, 4), (0, 2, 5), (3, 5, 7), (6, 5, 9)]$
- D. $[(9, 0, 9), (6, 1, 4), (7, 1, 8), (0, 2, 5), (3, 5, 7), (6, 5, 9)]$

Your Answer: C

Correct Answer: C

Correct

Discuss

Q #38

Multiple Choice Type

Award: 2

Penalty: 0.67

Probability

Consider the quadratic equation $x^2 + \frac{x}{2} + c = 0$, where c is chosen uniformly randomly from the interval $[0, 1]$. What is the probability that the given quadratic equation has a real solution?

The solutions of $ax^2 + bx + c = 0$ are given by $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

- A. $1/2$
- B. $1/4$
- C. $1/8$
- D. $1/16$

Your Answer: D

Correct Answer: D

Correct

Discuss

Q #39

Multiple Select Type

Award: 2

Penalty: 0

Linear Algebra

Consider a 2×2 matrix M . Which of the following are NOT POSSIBLE for the system of equations $Mx = p$?

- A. no solutions for some but not all \vec{p} ; exactly one solution for all other \vec{p}
- B. exactly one solution for some but not all \vec{p} ; more than one solution for all other \vec{p}

- C. no solutions for some but not all \vec{p} ; more than one solution for all other \vec{p}
- D. no solutions for some \vec{p} , exactly one solution for some \vec{p} and more than one solution for some \vec{p}

Your Answer: A;B;D Correct Answer: A;B;D Correct Discuss

Q #40 Multiple Select Type Award: 2 Penalty: 0 Databases

Consider the following database relation: $R = (SFLNGCRWH) = (S : \text{SID}, F: \text{First Name}, L: \text{Last Name}, N: \text{Number of Units}, G: \text{GPA}, C: \text{Course (of teaching)}, R: \text{Rating for class}, W: \text{Wage}, H: \text{Hours per week of work})$

Given the following set of functional dependencies (FDs): $F = \{S \rightarrow FL, S \rightarrow NG, SC \rightarrow R, CH \rightarrow W, FL \rightarrow R, C \rightarrow H, H \rightarrow C\}$, which of the following additional FDs (added to the set in isolation from the other answer choices) would reduce the size of the candidate key if it were the only one applied?

- A. SID determines Rating
- B. Rating determines Wage
- C. Rating determines Course
- D. Rating and First Name determine Wage and Hours of Work

Your Answer: C;D Correct Answer: C;D Correct Discuss

Q #41 Multiple Select Type Award: 2 Penalty: 0 Computer Networks

Consider the following forwarding table in a router that uses longest prefix matching to forward packets. Assume that 4-bit addressing is used.

prefix	interface
X	1
Y	2
Otherwise	3

We know that packets with an address of 0100 are forwarded to Interface 1 and packets with an address of 0010 are forwarded to Interface 2.

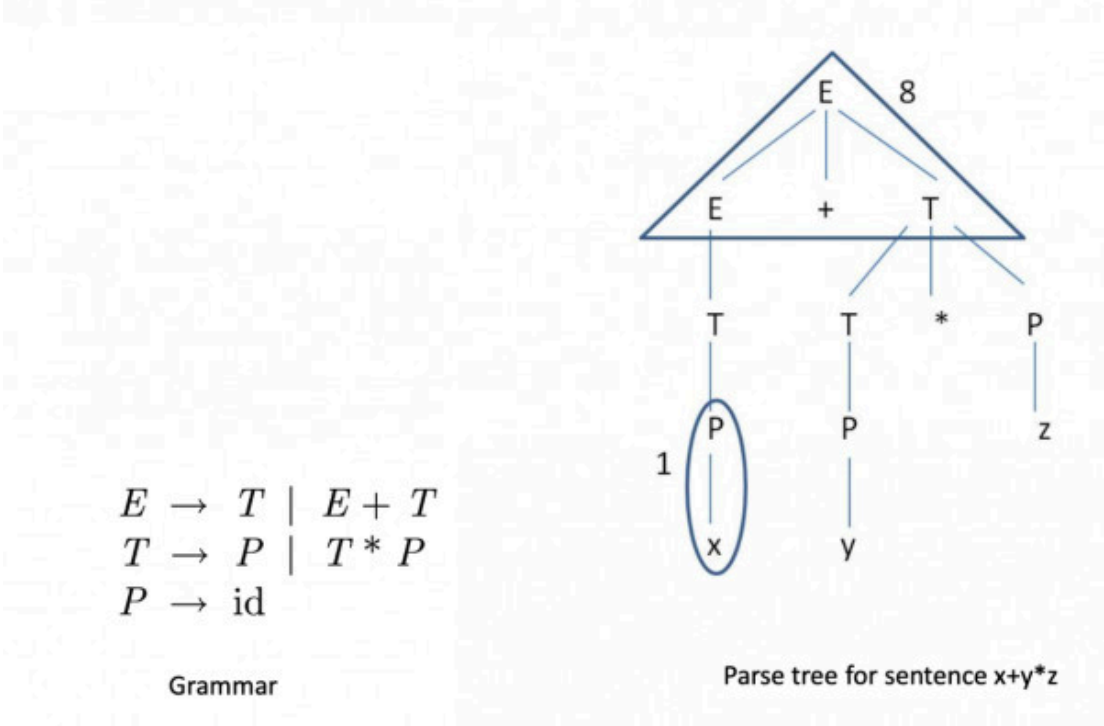
Which of the following CAN be the values for X and Y ?

- A. $X = 0$ and $Y = 00$
- B. $X = 01$ and $Y = 00$
- C. $X = 010$ and $Y = 00$
- D. $X = 00$ and $Y = 0$

Your Answer: Correct Answer: A;B;C Not Attempted Discuss

Q #42 Multiple Choice Type Award: 2 Penalty: 0.67 Compiler Design

Consider the following given grammar and the parse tree for the sentence $x + y * z$.



The first reduction made by the shift-reduce parser is labeled as 1, and we keep labeling in the same increasing order, such that the 8th (here, the last) reduction made by the parser is labeled as 8.

Which of the following statements is TRUE regarding the labeling of reductions?

- A. $E \rightarrow T$ will be labeled 5.
- B. $E \rightarrow T$ will be labeled 3.
- C. $T \rightarrow T * P$ will be labeled 6.
- D. $T \rightarrow T * P$ will be labeled 7.

Your Answer: C

Correct Answer: B;D

Incorrect

Discuss

Q #43

Numerical Type

Award: 2

Penalty: 0

Compiler Design

The grammar shown below is LL(k) for some value of k. What is the smallest value of k for which this grammar is LL(k)?

- 1 S \rightarrow a A a
- 2 \rightarrow b A b
- 3 A \rightarrow a
- 4 \rightarrow a b

Your Answer: 3

Correct Answer: 3

Correct

Discuss

Q #44

Multiple Choice Type

Award: 2

Penalty: 0.67

Programming in C

Consider the following pseudocode procedure.

```
int mystery ( int n )
int temp  $\leftarrow$  0
for ( int c  $\leftarrow$  1; c  $\leq$  n; c  $\leftarrow$  c + 1 )
    if ( ( c % 3 ) == 0 )
        temp  $\leftarrow$  temp + c
    end if
end for
return temp
end mystery
```

Which of the following best describes procedure mystery?

- A. It returns a list of numbers from 1 to n .
- B. It prints every third number from 1 to n .
- C. It returns the sum of the numbers from 1 to n .
- D. It returns the sum of the multiples of 3 from 1 to n .

Your Answer: D Correct Answer: D Correct Discuss

Q #45 Numerical Type Award: 2 Penalty: 0 CO and Architecture

Consider the cache of size 512 bytes that is direct-mapped?
Suppose the size of integer is 4 bytes and block size is 16 bytes. Assume cache is initially empty and all data except for the array x are stored in registers, and that the array x starts at address 0x0.

```
int x[128];
int i;
int sum = 0;
5. for (i = 0; i < 128; i++) {
    sum += x[i];
}
```

What is the miss rate for the above loop? (roundoff to two decimal places)

Your Answer: 0.25 Correct Answer: 0.25 Correct Discuss

Q #46 Numerical Type Award: 2 Penalty: 0 Combinatory

The coefficient of x^6 in the expansion of $A(x)$ is, where

$$A(x) = \frac{x(1+x)}{(1-x)^3}$$

Your Answer: 36 Correct Answer: 36 Correct Discuss

Q #47 Numerical Type Award: 2 Penalty: 0 Graph Theory

A strongly connected component (SCC) of a directed graph $G = (V, E)$ is a maximal set of vertices such that any two vertices in the set are mutually reachable.

Given a directed graph $G = (V, E)$, it is convenient to represent the connectivity properties of G using an associated directed acyclic graph $G' = (V', E')$, where the vertices in V' are the strongly connected components of G and for $S, T \in V'$, (S, T) is in E' if and only if there exist $u \in S$ and $v \in T$ such that $(u, v) \in E$.

Let G be the graph shown below.

Let the number of vertices & edges in its associated directed acyclic graph G' be A, B respectively, then what is $A + B$?

Your Answer: 9

Correct Answer: 11

Incorrect

Discuss

Q #48

Multiple Select Type

Award: 2

Penalty: 0

Mathematical Logic

Let F and G be two propositional formulae.
Which of the following is/are True?

- A. If $F \vee G$ is a tautology then at least one of F, G is a tautology.
- B. If $F \wedge G$ is a contradiction then at least one of F, G is a contradiction.
- C. If $F \rightarrow G$ is a tautology then either F is a contradiction or G is a tautology.
- D. If $F \rightarrow G$ is a contradiction then F is a tautology and G is a contradiction.

Your Answer: A;B;C;D

Correct Answer: D

Incorrect

Discuss

Q #49

Numerical Type

Award: 2

Penalty: 0

Digital Logic

Consider the shift register circuit shown in below figure. Assume that $I_3I_2I_1I_0 = 0101$ has been loaded in the 4-bit register using the parallel load mechanism (i.e., shift=0). After the data has been stored in the register, for how many consecutive positive edges of the clock signal we need to keep shift=1 such that zero detect is activated to a 1?

Your Answer: 3

Correct Answer: 3

Correct

Discuss

Q #50

Multiple Choice Type

Award: 2

Penalty: 0.67

Digital Logic

The logic circuit above is used to compare two unsigned 2-bit numbers, $X_1X_0 = X$ and $Y_1Y_0 = Y$, where X_0 and Y_0 are the least significant bits. (A small circle on any line in a logic diagram indicates logical NOT.) Which of the following always makes the output Z have the value 1?

- A. $X > Y$
- B. $X < Y$
- C. $X = Y$
- D. $X \neq Y$

Your Answer: A

Correct Answer: A

Correct

Discuss

Q #51

Multiple Choice Type

Award: 2

Penalty: 0.67

Digital Logic

According to the IEEE standard, a 32-bit, single-precision, floating-point number N is defined to be

$$N = (-1)^S \times 1.F \times 2^{E-127}$$

where S is the sign bit, F the fractional mantissa, and E the biased exponent.

A floating-point number is stored as $S : E : F$, where S , E , and F are stored in 1 bit, 8 bits, and 23 bits, respectively.

What is the largest finite positive value that can be stored using a single precision float?

- A. $(1 - 2^{-23}) * 2^{127}$
- B. $(1 + (1 - 2^{-23})) * 2^{127}$
- C. $(1 - 2^{-23}) * 2^{128}$
- D. $(1 + (1 - 2^{-23})) * 2^{128}$

Your Answer: B

Correct Answer: B

Correct

Discuss

Q #52

Multiple Select Type

Award: 2

Penalty: 0

CO and Architecture

At a particular point in time, the buffer cache has dirty data that needs to be flushed to disk. Suppose that the identities of these blocks can be listed in [track:sector] form as follows:

$$[10 : 5], [22 : 9], [11 : 6], [2 : 10], [20 : 5], [32 : 4], [32 : 5], [6 : 7]$$

Assume that the disk head is currently positioned over track 20.

Which of the following disk scheduling algorithms yield the following sequence of writes:

$$[20 : 5], [22 : 9], [32 : 4], [32 : 5], [11 : 6], [10 : 5], [6 : 7], [2 : 10]$$

- A. Shortest Seek Time First
- B. Scan (initially moving upwards)
- C. Look (initially moving upwards)
- D. C-SCAN (initially moving upwards)

Your Answer: A;B;C

Correct Answer: A;B;C

Correct

Discuss

Q #53

Multiple Choice Type

Award: 2

Penalty: 0.67

CO and Architecture

Assume an instruction mix of 15% conditional branches, 1% unconditional branches, 84% all others, and 60% of the conditional branches are taken. We have a 4-stage pipeline where branch target locations are computed in the 3rd stage and branch conditions in the 4th stage. Assume no other sources of pipeline stalls.

We want to decide whether to implement "predict taken" or "predict not taken" for branch prediction for this machine. For "predict not taken", even unconditional branches are assumed not taken.

Which of the following is correct?

- A. "predict not taken" is better for this machine.
- B. "predict taken" is better for this machine.
- C. For both "predict taken", "predict not taken" branch predictions, CPI is the 1.38
- D. For both "predict taken", "predict not taken" branch predictions, CPI is the 1.30

Your Answer:

Correct Answer: A

Not Attempted

Discuss

Q #54

Multiple Select Type

Award: 2

Penalty: 0

Theory of Computation

Which of the following languages are Turing-recognizable? A. $\{\langle M \rangle \mid M \text{ is a (deterministic) Turing machine and } M \text{ accepts } 010\}$. B. $\{\langle M \rangle \mid M \text{ is a nondeterministic Turing machine and } M \text{ accepts } 010\}$. C. $\{\langle M \rangle \mid M \text{ is a Turing machine and } M \text{ does not accept } 101\}$. D. $\{\langle M \rangle \mid M \text{ is a Turing machine and } L(M) = \Sigma^*\}$.

Your Answer: D

Correct Answer: A;B

Incorrect

Discuss

Q #55

Multiple Select Type

Award: 2

Penalty: 0

Theory of Computation

Which of the following statements are true for every language $L \subseteq \{0, 1\}^*$?

A. L^* is infinite.

B. L is accepted by some DFA if and only if L is accepted by some NFA.

C. If L is the union of two undecidable languages, then L is undecidable.

D. If L is the union of two decidable languages, then L is decidable.

Your Answer: B;C;D

Correct Answer: B;D

Incorrect

Discuss

You're doing good, you can target above 70 percentage!