

Time left 1:15:21

**Question 1**

Not yet answered

Marked out of 6

A Turing machine has

Select one or more:

- a. a tape whose length is limited by the length of input string.
- b. a tape of infinite length.
- c. a tape that can be used both for reading and writing.
- d. an infinite number of internal states.

**Question 2**

Not yet answered

Marked out of 4

The language  $L = \{a^n b^m : n \geq 0, m \geq 1\}$

Select one or more:

- a. can be generated by a grammar that does not contain recursion.
- b. can be described by a regular expression.
- c. contains the string  $aabbb$ .
- d. contains the string  $ababb$ .

**Question 3**

Not yet answered

Marked out of 4

The multiplicative inverse of 4 modulo 7 is

Select one:

- a. 6
- b. 3
- c. does not exist
- d. 2

**Question 4**

Not yet answered

Marked out of 6

Little Fermat's Theorem states that:

Select one:

- a.  $a^{(p-1)} \equiv 1 \pmod{p}$ , where  $p$  is a prime and  $a$  is an integer coprime to  $p$ .
- b.  $a^{(p-1)} \equiv 0 \pmod{p}$ , where  $p$  is a prime and  $a$  is an integer coprime to  $p$ .
- c.  $a^{(p-1)} \equiv 1 \pmod{p}$ , where  $p$  is a prime and  $a$  is an integer.
- d.  $a^{(p-1)} \equiv 1 \pmod{p}$ , where  $p$  and  $a$  are composite numbers.

**Question 5**

Not yet answered

Marked out of 6

Transaction journal (log file, WAL) in a relational database

- a. keeps track of all actions executed by the database management system.
- b. is used to store metadata.
- c. is used for data recovery after the database system crash.
- d. is used for debugging of SQL commands.

**Question 6**

Not yet answered

Marked out of 4

Data Manipulation Language (SQL DML)

Select one or more:

- a. contains the commands INSERT, UPDATE, and DELETE
- b. contains the commands GRANT, REVOKE
- c. contains the commands COMMIT, ROLLBACK
- d. contains the commands CREATE, ALTER, and DROP

**Question 7**

Not yet answered

Marked out of 6

Which of the following properties for summation and multiplication of square matrices  $\mathbf{A}$ ,  $\mathbf{B}$ ,  $\mathbf{C} \in \mathbb{R}^{n,n}$  are correct?

Select one or more:

- a.  $(\mathbf{A} \cdot \mathbf{B})^T = \mathbf{A}^T \cdot \mathbf{B}^T$
- b.  $(\mathbf{A} + \mathbf{B}) \cdot \mathbf{C} = \mathbf{A} \cdot \mathbf{C} + \mathbf{B} \cdot \mathbf{C}$  (distributive law)
- c.  $\mathbf{A} \cdot \mathbf{B} = \mathbf{B} \cdot \mathbf{A}$  (commutative law)
- d.  $\mathbf{A} \cdot (\mathbf{B} \cdot \mathbf{C}) = (\mathbf{A} \cdot \mathbf{B}) \cdot \mathbf{C}$  (associative law)

**Question 8**

Not yet answered

Marked out of 4

Suppose matrix  $\mathbf{A}$  has an inverse matrix  $\mathbf{A}^{-1}$ . Which ones of the following statements are true?

Select one or more:

- a. The rank of matrix  $\mathbf{A}$  is smaller than the number of its rows.
- b. The determinants of  $\mathbf{A}$  and  $\mathbf{A}^{-1}$  are equal.
- c. The ranks of  $\mathbf{A}$  and  $\mathbf{A}^{-1}$  are equal.
- d. Matrix  $\mathbf{A}$  is regular.

**Question 9**

Not yet answered

Marked out of 4

Simplify the following propositional logic formula  $B \wedge (A \vee \neg(\neg B \vee A))$ .

Select one:

- a.  $B$
- b.  $B \wedge A$
- c.  $B \wedge \neg A$
- d.  $B \vee \neg A$

**Question 10**

Not yet answered

Marked out of 6

Assuming that  $p(x)$  is a unary predicate, which ones of the following predicate logic formulae are logical consequences of  $\neg(\exists x)p(x)$ ?

Select one or more:

- a.  $(\forall x)\neg p(x)$
- b.  $(\forall x)p(x)$
- c.  $(\exists x)p(x)$
- d.  $(\exists x)\neg p(x)$

**Question 11**

Not yet answered

Marked out of 4

A RAID array consists of 10 identical physical disks. Which type of RAID has the smallest redundancy?

Select one:

- a. RAID 0 + 1
- b. RAID 1 + 0
- c. RAID 5
- d. RAID 6

**Question 12**

Not yet answered

Marked out of 6

A hard disk drive has a rotational speed of 6000 RPM. What is its average rotational latency (delay) when reading one disk sector?

Select one:

- a. 5ms
- b. 10ms
- c. 1ms
- d. 0ms

**Question 13**

Not yet answered

Marked out of 4

A binary tree depth is 2 (its root depth is 0). The number of leaves of such a tree is

Select one or more:

- a. at least 1 and at most 3.
- b. at least 2 and at most 4.
- c. at least 0 and at most 2.
- d. at least 1 and at most 4.

**Question 14**

Not yet answered

Marked out of 4

The network address mask /23 of IPv4 can be written as:

Select one:

- a. 255.255.248.0
- b. 255.255.255.128
- c. 255.255.254.0
- d. 255.252.0.0

**Question 15**

Not yet answered

Marked out of 6

The head of a TCP packet includes the source and destination ports. The value is used for

Select one:

- a. discovery of the receiver sliding window size.
- b. checking of the implemented TCP version.
- c. identification of the process involved in the communication.
- d. marking of special data in the TCP flow.

**Question 16**

Not yet answered

Marked out of 4

There are 4 men and 3 women at a party. In how many different ways could we form two mixed pairs from them (the order of pairs is irrelevant)?

Select one:

- a. 30
- b. 60
- c. 66
- d. 36

**Question 17**

Not yet answered

Marked out of 6

How many natural numbers from the interval  $[1, 960]$  are coprime with 960?

Select one:

- a. 352
- b. 511
- c. 127
- d. 481
- e. 256

**Question 18**

Not yet answered

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Consider we have a pointer to the start of a singly linked list containing exactly  $n$  elements. If we use a best known algorithm to insert a new element in the last list position, what is the dependence of the number of steps needed to do the insertion on the list size  $n$ ?

Select one:

- a. logarithmic
- b. quadratic
- c. does not depend
- d. linear

**Question 19**

Not yet answered

Marked out of 6

Which of the following assertions are correct?

Select one or more:

- a. If two random variables are uncorrelated, then they are independent.
- b. If two random variables are independent, then they are uncorrelated.
- c. If two random variables are independent, then they have zero variances.
- d. If two random variables are uncorrelated, then their covariance equals zero.

**Question 20**

Not yet answered

Marked out of 4

Output  $Y$  of a multiplexor with two data inputs  $D_0$  and  $D_1$  and one control input  $E$  can be expressed by the expression:

Select one:

- a.  $Y = D_0 \cdot E + D_1 \cdot E$
- b.  $Y = D_0 \cdot D_1 \cdot E$
- c.  $Y = D_0 \cdot \overline{E} + D_1 \cdot E$
- d.  $Y = \overline{D_0} \cdot \overline{E} + D_1 \cdot E$