Started on	Friday, 18 November 2022, 11:59 PM
State	Finished
Completed on	Saturday, 19 November 2022, 12:00 AM
Time taken	21 secs
Grade	**0** out of 100

Question **1**

Not answered

Marked out of 6

Consider the regular expression $V = (a+b)^*cb(a+c)^*$. A minimal deterministic finite automaton without redundant states that accepts the language described by this expression has:

Select one:

- a. 3 states.
- b. 5 states.
- c. 4 states.
- d. 6 states.

The correct answer is: 3 states.

Question **2**

Not answered

Marked out of 4

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

Select one or more:

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

The correct answers are: can be described by a regular expression., contains the string $aabbb$.

Question **3**

Not answered

Marked out of 4

The multiplicative inverse of 4 modulo 7 is

Select one:

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

The correct answer is: 2

Question **4**

Not answered

Marked out of 6

Little Fermat's Theorem states that:

Select one:

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

The correct answer is: $a^{(p-1)} \equiv 1 \pmod{p}$, where p is a prime and a is an integer coprime to p.

Question **5**

Not answered

Marked out of 6

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

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

The correct answers are: is used for data recovery after the database system crash., keeps track of all actions executed by the database management system.

Question **6**

Not answered

Marked out of 4

Transaction in SQL

Select one or more:

- a. consists always of exactly one SQL command.
- b. consists always of more than one SQL commands.
- c. is a set of SQL commands performed as a single logical unit of work.
- d. consists of one or more SQL commands.

The correct answers are: is a set of SQL commands performed as a single logical unit of work., consists of one or more SQL commands.

Question **7**

Not answered

Marked out of 6

A finite set of vectors $\mathbf{a}_1, \ldots, \mathbf{a}_n$ is linearly independent if it holds that:

Select one or more:

- a. the set does not contain a zero vector.
- b. the set contains a zero vector.
- c. there is no set of coefficients $\alpha_i \neq 0, i = 1, \ldots, n$, such that $\alpha_1 \mathbf{a}_1 + \ldots + \alpha_n \mathbf{a}_n = 0$.
- d. the vectors in the set are pairwise different.

The correct answer is: there is no set of coefficients $\alpha_i \neq 0, i = 1, \ldots, n$, such that $\alpha_1 \mathbf{a}_1 + \ldots + \alpha_n \mathbf{a}_n = 0$.

Question **8**

Not answered

Marked out of 4

Possible steps of the Gauss elimination method for matrices include:

Select one:

- a. multiplying a row by -1.
- b. deleting a row that contains a minimal number of non-zero elements.
- c. replacing a row by some other row.
- d. multiplying a row by zero.

The correct answer is: multiplying a row by -1.

Question **9**

Not answered

Marked out of 4

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

Select one:

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

The correct answer is: B

Question **10**

Not answered

Marked out of 6

Decide which ones of the following propositional logic formulae are logical consequences of $A \wedge B$.

Select one or more:

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

The correct answers are: $\neg A \Rightarrow \neg B$, $A \wedge (\neg A \vee B)$

Question **11**

Not answered

Marked out of 4

Which of the following synchronization techniques are block-based and can be used to synchronize processes or threads?

Select one or more:

- a. monitors
- b. Peterson's algorithm
- c. condition variables
- d. instruction TSL (Test-and-Set Lock)

The correct answers are: condition variables, monitors

Question **12**

Not 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. 0ms
- b. 1ms
- c. 5ms
- d. 10ms

The correct answer is: 5ms

Question **13**

Not 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 0 and at most 2.
- c. at least 1 and at most 4.
- d. at least 2 and at most 4.

The correct answer is: at least 1 and at most 4.

Question **14**

Not answered

Marked out of 4

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

Select one:

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

The correct answer is: 255.255.254.0

Question **15**

Not 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. marking of special data in the TCP flow.

b. identification of the process involved in the communication.

c. discovery of the receiver sliding window size.

d. checking of the implemented TCP version.

The correct answer is: identification of the process involved in the communication.

Question **16**

Not answered

Marked out of 6

Assume that a box contains 3 white and 4 blue balls. One ball is randomly picked up from that box and put aside. Then another ball is randomly picked up from the box, which turns out to be white. What is the probability, that the first ball was also white?

Select one:

a. 3/7

b. 2/7

c. 1/2

d. 1/3

The correct answer is: 1/3

Question **17**

Not 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. $Y = \overline{D_0} . \overline{E} + D_1 . E$

b. $Y = D_0 . \overline{E} + D_1 . E$

c. $Y = D_0 . D_1 . E$

d. $Y = D_0 . E + D_1 . E$

The correct answer is: $Y = D_0 . \overline{E} + D_1 . E$

Question **18**

Not answered

Marked out of 4

Determine the combination of properties valid for the binary relation $R = \{(a,b),(a,c)\} \cup \Delta_X$ on the set $X = \{a,b,c\}$. The symbol Δ_X denotes the identity relation on X.

Select one:

- a. reflexive, antisymmetric, transitive
- b. reflexive, symmetric, transitive
- c. antisymmetric, asymmetric, transitive
- d. reflexive, asymmetric, transitive

The correct answer is: reflexive, antisymmetric, transitive

Question **19**

Not 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

The correct answer is: 256

Question **20**

Not answered

Marked out of 6

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

The correct answer is: linear

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