CS402
Theory of Automata

Important mcqs

Lec 23 - Regular languages

1. **Which of the following is a regular language?**
   a) {anbn | n ? 0}
   b) {anbn | n > 0}
   c) {anbm | n ? m}
   d) {an | n is prime}
   Answer: a) {anbn | n ? 0}

   Which of the following operations does not result in a regular language?
   a) Union
   b) Concatenation
   c) Kleene star
   d) Intersection
   Answer: d) Intersection

   Which of the following is a regular expression for the language consisting of all strings of 0's and 1's that do not contain the substring 11?
   a) (0+1)11(0+1)
   b) (0+1)0(0+10)
   c) (0+1)(1+01)
   d) (0+1)1(0+01)
   Answer: d) (0+1)1(0+01)

   Which of the following is not a regular language?
   a) {0n1n | n ? 0}
   b) {0n1n | n > 0}
   c) {0n1m | n, m ? 0}
   d) {0n | n is a perfect square}
   Answer: d) {0n | n is a perfect square}

   Which of the following is a regular expression for the language consisting of all strings of 0's and 1's that end with 01?
   a) (0+1)*01
   b) (0+1)*0(1+01)
   c) (0+1)*1(0+1)*01
   d) (0+1)1(1+01)
   Answer: c) (0+1)*1(0+1)*01

   Which of the following is a regular expression for the language consisting of all strings of 0's and 1's that contain at least one 0 and one 1?
   a) (0+1)01(0+1)

b) (0+1)*0(0+1)1(0+1)
c) (0+1)*0+(0+1)1+
d) (0+1)
Answer: b) (0+1)*0(0+1)1(0+1)

Which of the following is a regular language?
a) {w | w contains an equal number of 0's and 1's}
b) {w | the length of w is a prime number}
c) {w | w contains a substring of three 0's}
d) {w | the number of 0's in w is equal to the number of 1's in w}
Answer: d) {w | the number of 0's in w is equal to the number of 1's in w}

Which of the following is a regular expression for the language consisting of all strings of 0's and 1's with an even number of 0's and an odd number of 1's?
a) (0+1)*00(0+1)11(0+1)
b) (0+1)*01(0+1)10(0+1)
c) (0+1)*0(0+1)*1(0+1)*1
d) (0+1)*0(0+1)*1+
Answer: c) (0+1)*0(0+1)*1(0+1)*1

Which of the following is not a regular language

Lec 24 - Complement of a language

1. **What is the complement of the language {a, b} over the alphabet {a, b, c}?**
   a) {a, b, c}
   b) {c}
   c) {aa, bb, ab, ba, ac, bc, ca, cb}
   d) {?}
   Answer: c) {aa, bb, ab, ba, ac, bc, ca, cb}

   Which of the following is true about the complement of a regular language?
   a) It is always regular.
   b) It is never regular.
   c) It can be regular or non-regular.
   d) None of the above.
   Answer: a) It is always regular.

   What is the complement of the language {?} over the alphabet {0, 1}?
   a) {?}
   b) {0, 1}
   c) ?
   d) {00, 11}
   Answer: c) ?

   Which of the following is true about the complement of a context-free language?
   a) It is always context-free.
   b) It is never context-free.
   c) It can be context-free or non-context-free.
   d) None of the above.
   Answer: c) It can be context-free or non-context-free.

   What is the complement of the language {a^n b^n | n ? 0} over the alphabet {a, b}?
   a) {a^n b^m | n ? m}
   b) {a^n b^m | n = m}
   c) {a^m b^n | n ? m}
   d) {a^m b^n | n = m}
   Answer: a) {a^n b^m | n ? m}

   Which of the following is true about the complement of the empty language?
   a) It is the empty language itself.
   b) It is the universal language.
   c) It is both the empty language and the universal language.
   d) It is neither the empty language nor the universal language.
   Answer: b) It is the universal language.

   What is the complement of the language {a^n | n ? 0} over the alphabet {a, b}?
   a) {a^n b^m | n ? m}
   b) {a^n b^m | n = m}
   c) {b^n | n ? 0}
   d) {a}
   Answer: c) {b^n | n ? 0}

   Which of the following is true about the complement of a regular language?
   a) It is always a context-free language.

b) It is always a regular language.
c) It can be a context-free language or a non-context-free language.
d) It can be a regular language or a non-regular language.
Answer: d) It can be a regular language or a non-regular language.

What is the complement of the language {a^n b^n c^n | n ? 0} over the alphabet {a, b, c}?
a) {a^n b^m c^k | n ? m or n ? k}
b) {a^n b^m c^k | n = m and n = k}
c) {a^n b^n c^n | n ? 0}
d) {a^n | n ? 0}
Answer: a) {a^n b^m c^k | n ? m or n ? k}

Which of the following is true about the complement of a non-regular language?
a) It is always a regular language.
b) It is never a regular language.
c) It can be a regular language or a non-regular language.
d) None

Lec 25 - Nonregular languages

1. **Which of the following is a nonregular language?**
   a) The set of all strings over {0,1} with an equal number of 0's and 1's
   b) The set of all strings over {0,1} that contain the substring 110
   c) The set of all strings over {0,1} that start and end with the same symbol
   d) The set of all strings over {0,1} that contain an equal number of 0's and 1's
   Answer: b

   Which of the following is true about nonregular languages?
   a) They can be recognized by deterministic finite automata
   b) They can be expressed by regular expressions
   c) They have complex or infinite structures that cannot be captured by finite automata
   d) They are always context-free languages
   Answer: c

   Which of the following is a nonregular language?
   a) The set of all strings over {0,1} that contain at least three 1's
   b) The set of all strings over {0,1} that contain an even number of 0's
   c) The set of all strings over {0,1} that contain an odd number of 1's
   d) The set of all strings over {0,1} that start and end with different symbols
   Answer: a

   Which of the following is true about nonregular languages?
   a) They can be recognized by pushdown automata
   b) They can be recognized by Turing machines
   c) They are closed under union, concatenation, and Kleene star
   d) They can always be transformed into regular languages by adding additional symbols
   Answer: b

   Which of the following is a nonregular language?
   a) The set of all strings over {a,b} that have an equal number of a's and b's
   b) The set of all strings over {a,b} that start and end with the same symbol
   c) The set of all strings over {a,b} that contain the substring abab
   d) The set of all strings over {a,b} that contain an equal number of a's and b's
   Answer: c

   Which of the following is true about nonregular languages?
   a) They are always infinite
   b) They cannot be recognized by any type of automaton
   c) They are closed under intersection and complementation
   d) They can be recognized by nondeterministic finite automata
   Answer: b

   Which of the following is a nonregular language?
   a) The set of all strings over {a,b} that contain an equal number of a's and b's
   b) The set of all strings over {a,b} that start and end with the same symbol
   c) The set of all strings over {a,b} that contain the substring aabb
   d) The set of all strings over {a,b} that have an odd number of a's
   Answer: c

   Which of the following is true about nonregular languages?
   a) They are always context-sensitive languages

b) They can be expressed by context-free grammars
c) They are closed under intersection and complementation
d) They can be recognized by pushdown automata
Answer: d

Which of the following is a nonregular language?
a) The set of all strings over {0,1} that contain the substring 101
b) The set of all strings over {0,1} that have an odd number of 0's
c) The set of all strings over {0,1} that contain the substring 0110
d) The set of all strings over {0,1

Lec 26 - Pumping Lemma

1. **The Pumping Lemma can be used to prove that a language is:**
   a) Regular
   b) Context-free
   c) Turing-recognizable
   d) None of the above

   Answer: d) None of the above

   The Pumping Lemma states that if a language is regular, then:
   a) It can be parsed by a pushdown automaton
   b) It can be generated by a context-free grammar
   c) It can be pumped
   d) None of the above

   Answer: c) It can be pumped

   The Pumping Lemma applies to:
   a) All regular languages
   b) Some regular languages
   c) All context-free languages
   d) None of the above

   Answer: b) Some regular languages

   The Pumping Lemma can be used to prove that a language is not regular by:
   a) Demonstrating that it can be pumped
   b) Showing that it is accepted by a pushdown automaton
   c) Constructing a regular expression that generates it
   d) None of the above

   Answer: a) Demonstrating that it can be pumped

   If a language fails the pumping condition of the Pumping Lemma, it means that:
   a) The language is not regular
   b) The language is context-free
   c) The language is regular
   d) None of the above

   Answer: a) The language is not regular

   The Pumping Lemma can be used to prove that a language is not context-free:
   a) True
   b) False

   Answer: b) False

   The Pumping Lemma can be used to prove that a language is not regular if:
   a) The length of a string in the language is greater than or equal to the number of states in the

corresponding DFA
b) The length of a string in the language is less than or equal to the number of states in the corresponding DFA
c) The length of a string in the language is greater than or equal to the number of transitions in the corresponding DFA
d) None of the above

Answer: a) The length of a string in the language is greater than or equal to the number of states in the corresponding DFA

Which of the following is a necessary condition for a language to be regular?
a) The Pumping Lemma holds for all strings in the language
b) The Pumping Lemma holds for some strings in the language
c) The Pumping Lemma does not hold for any string in the language
d) None of the above

Answer: b) The Pumping Lemma holds for some strings in the language

The Pumping Lemma applies to which type of languages?
a) Regular languages
b) Context-free languages
c) Recursive languages
d) All of the above

Answer: a) Regular languages

Which of the following is a consequence of the Pumping Lemma?
a) All regular languages are context-free
b) All context-free languages are regular
c) All languages are either regular or context-free
d) None of the above

Answer: d) None of the above

Lec 27 - Pumping Lemma version II

1. **What is the Pumping Lemma Version II used for?**
   a) To prove that a language is regular
   b) To prove that a language is context-free
   c) To prove that a language is not context-free
   d) None of the above
   Answer: b

   What is the pumping length for the Pumping Lemma Version II?
   a) The length of the shortest string in the language
   b) The length of the longest string in the language
   c) The length of the middle segment of a string in the language
   d) The length of the prefix of a string in the language
   Answer: a

   How many parts does a string need to be divided into for the Pumping Lemma Version II?
   a) Two
   b) Three
   c) Four
   d) Five
   Answer: d

   What is the minimum length of the middle segment in the Pumping Lemma Version II?
   a) p
   b) 1
   c) 0
   d) It depends on the language
   Answer: c

   Can the Pumping Lemma Version II be used to prove that a language is regular?
   a) Yes
   b) No
   Answer: b

   What is the condition for the middle segment in the Pumping Lemma Version II?
   a) Its length must be greater than or equal to p
   b) Its length must be less than or equal to p
   c) Its length can be any value
   d) It depends on the language
   Answer: b

   What is the condition for the last segment in the Pumping Lemma Version II?
   a) Its length must be greater than or equal to p
   b) Its length must be less than or equal to p
   c) Its length can be any value
   d) It depends on the language
   Answer: c

   What is the minimum length of the non-empty segment in the Pumping Lemma Version

II?
a) p
b) 1
c) 0
d) It depends on the language
Answer: b

What is the minimum number of iterations required in the Pumping Lemma Version II?
a) Zero
b) One
c) Two
d) It depends on the language
Answer: a

What is the Pumping Lemma Version II used for in language processing?
a) Parsing
b) Code optimization
c) Text analysis
d) All of the above
Answer: a

Lec 28 - Pseudo theorem

1. **Which of the following best describes a pseudo theorem?**
   a) A statement that is always true
   b) A statement that appears to be true, but is actually false
   c) A statement that is neither true nor false
   d) A statement that is too complex to understand
   Answer: b) A statement that appears to be true, but is actually false

   Pseudo theorems can be misleading because they:
   a) Are always intentionally false
   b) Are always presented with poor writing
   c) Can appear to be rigorously proven
   d) Are only found in mathematics
   Answer: c) Can appear to be rigorously proven

   What is the best way to identify a pseudo theorem?
   a) By checking if it is always true
   b) By checking if it is always false
   c) By carefully scrutinizing its assumptions and logical steps
   d) By asking a friend who is good at math
   Answer: c) By carefully scrutinizing its assumptions and logical steps

   Which of the following is an example of a pseudo theorem?
   a) The sum of two odd numbers is always odd
   b) Every prime number greater than 2 is odd
   c) Every even number can be written as the sum of two prime numbers
   d) All real numbers are rational
   Answer: d) All real numbers are rational

   Pseudo theorems can be harmful because they can:
   a) Lead to incorrect conclusions and wasted effort
   b) Improve our understanding of mathematics
   c) Encourage critical thinking skills
   d) Increase the popularity of mathematics
   Answer: a) Lead to incorrect conclusions and wasted effort

   What is the difference between a pseudo theorem and a paradox?
   a) A pseudo theorem is always false, while a paradox is always true
   b) A pseudo theorem appears to be true, while a paradox appears to be false
   c) A pseudo theorem is a false statement, while a paradox is a self-contradictory statement
   d) A pseudo theorem and a paradox are the same thing
   Answer: c) A pseudo theorem is a false statement, while a paradox is a self-contradictory statement

   Which of the following is a pseudo theorem related to calculus?
   a) Every continuous function has a derivative
   b) Every polynomial of odd degree has at least one real root
   c) Every limit exists
   d) Every function has a power series expansion
   Answer: d) Every function has a power series expansion

   Pseudo theorems are most commonly found in which subject area?
   a) Geometry

b) Algebra
c) Calculus
d) Trigonometry
Answer: c) Calculus

Why is it important to be aware of pseudo theorems?
a) They are always true
b) They are never true
c) They can be misleading and cause incorrect conclusions
d) They are always easy to identify
Answer: c) They can be misleading and cause incorrect conclusions

Which of the following is an example of a pseudo theorem related to geometry?
a) The sum of the interior angles of a triangle is always 180 degrees
b) The Pythagorean theorem
c) The formula for the area of a circle
d) Every regular polygon can be inscribed in a circle
Answer: d) Every regular polygon can be inscribed in a circle

Lec 29 - Decidability

1. **Which of the following is an example of a decidable problem?**
   A) The halting problem
   B) The traveling salesman problem
   C) The sorting problem
   D) The knapsack problem
   Answer: C) The sorting problem

   The complement of a decidable language is always:
   A) Decidable
   B) Undecidable
   C) Finite
   D) Regular
   Answer: A) Decidable

   Which of the following is an example of an undecidable problem?
   A) Checking whether a given number is prime
   B) Solving a system of linear equations
   C) Computing the square root of a number
   D) The halting problem
   Answer: D) The halting problem

   The Rice Theorem is used to:
   A) Prove the undecidability of problems
   B) Prove the decidability of problems
   C) Classify problems according to their complexity
   D) None of the above
   Answer: A) Prove the undecidability of problems

   Which of the following is an example of a language that is not decidable, but semi-decidable?
   A) The set of even numbers
   B) The set of prime numbers
   C) The set of palindromes
   D) The set of all Turing machines that halt on the empty input
   Answer: D) The set of all Turing machines that halt on the empty input

   The problem of deciding whether a given context-free grammar generates an infinite language is:
   A) Decidable
   B) Undecidable
   C) Semi-decidable
   D) Regular
   Answer: B) Undecidable

   Which of the following statements is true about decidable problems?
   A) They are always polynomial-time solvable
   B) They are always exponential-time solvable
   C) They can be solved in any amount of time

D) None of the above
Answer: A) They are always polynomial-time solvable

The set of all regular languages is:
A) Decidable
B) Undecidable
C) Semi-decidable
D) None of the above
Answer: A) Decidable

Which of the following is an example of a problem that is not even semi-decidable?
A) The halting problem
B) The set of all Turing machines that halt on the empty input
C) The set of all context-free grammars
D) The set of all regular expressions
Answer: C) The set of all context-free grammars

Which of the following statements is true about semi-decidable problems?
A) They are always decidable
B) They are always undecidable
C) They can be solved in any amount of time
D) They can be solved in a finite amount of time, but may not always terminate
Answer: D) They can be solved in a finite amount of time, but may not always terminate

Lec 30 - Context Free Grammar (CFG)

1. **Which of the following is true about context-free grammar?**
   A) It can describe only regular languages
   B) It can describe only context-sensitive languages
   C) It can describe both regular and context-sensitive languages
   D) It can describe only context-free languages
   Answer: D

   What is a production rule in a context-free grammar?
   A) A rule that specifies how to generate a string
   B) A rule that specifies the terminal symbols of a language
   C) A rule that specifies the non-terminal symbols of a language
   D) A rule that specifies the start symbol of a language
   Answer: A

   Which of the following is true about a context-free grammar?
   A) It can generate infinite strings
   B) It can generate only finite strings
   C) It can generate both finite and infinite strings
   D) It cannot generate any strings
   Answer: A

   Which of the following is a non-terminal symbol in a context-free grammar?
   A) a
   B) b
   C) A
   D) B
   Answer: C and D

   What is the purpose of the start symbol in a context-free grammar?
   A) It specifies the first production rule to be applied
   B) It specifies the last production rule to be applied
   C) It specifies the non-terminal symbols of a language
   D) It specifies the beginning of a string generated by the grammar
   Answer: D

   Which of the following is true about leftmost and rightmost derivations in a context-free grammar?
   A) They always produce the same parse tree
   B) They always produce different parse trees
   C) They can produce the same or different parse trees
   D) They cannot produce parse trees
   Answer: A

   Which of the following is true about a parse tree generated by a context-free grammar?
   A) It shows the order in which the production rules were applied
   B) It shows the terminal symbols of the language
   C) It shows the non-terminal symbols of the language
   D) It shows the start symbol of the language
   Answer: A, B, and C

   What is the Chomsky normal form of a context-free grammar?
   A) A form in which every production rule has only one non-terminal symbol on the right-hand

side
B) A form in which every production rule has at most two non-terminal symbols on the right-hand side
C) A form in which every production rule has only one terminal symbol on the right-hand side
D) A form in which every production rule has at most two terminal symbols on the right-hand side
Answer: B

Which of the following is true about the pumping lemma for context-free languages?
A) It is used to prove that a language is context-free
B) It is used to prove that a language is not context-free
C) It is used to prove that a language is regular
D) It is used to prove that a language is not regular
Answer: B

Which of the following is an example of a context-free language?
A) {anbn : n ? 0}
B) {anbn : n ? 1}
C) {anbmck : n, m, k ? 0}
D) {anbm : n, m ? 0}
Answer: C

Lec 31 - CFG terminologies

1. **Which of the following symbols can be rewritten by production rules in a Context-Free Grammar?**
   A. Non-terminal symbols only
   B. Terminal symbols only
   C. Both non-terminal and terminal symbols
   D. None of the above
   Answer: A

   What is the start symbol in a Context-Free Grammar?
   A. The first non-terminal symbol in the grammar
   B. The last non-terminal symbol in the grammar
   C. A special non-terminal symbol that represents the entire language generated by the grammar
   D. A special terminal symbol that represents the empty string
   Answer: C

   Which of the following is not a part of a production rule in a Context-Free Grammar?
   A. Non-terminal symbol on the left-hand side
   B. Terminal symbol on the right-hand side
   C. Non-terminal symbol on the right-hand side
   D. None of the above
   Answer: B

   What is a leftmost derivation in a Context-Free Grammar?
   A. A derivation in which the leftmost non-terminal symbol is always replaced in each step
   B. A derivation in which the leftmost terminal symbol is always replaced in each step
   C. A derivation in which the rightmost non-terminal symbol is always replaced in each step
   D. A derivation in which the rightmost terminal symbol is always replaced in each step
   Answer: A

   What is a parse tree in the context of Context-Free Grammar?
   A. A tree structure that represents the syntactic structure of a string derived from the grammar
   B. A tree structure that represents the semantic structure of a string derived from the grammar
   C. A tree structure that represents the alphabet of the grammar
   D. None of the above
   Answer: A

   What is ambiguity in a Context-Free Grammar?
   A. A situation where a string can be derived by more than one parse tree
   B. A situation where a string cannot be derived by any parse tree
   C. A situation where a string has more than one non-terminal symbol
   D. None of the above
   Answer: A

   What is Chomsky normal form for a Context-Free Grammar?
   A. A form in which all production rules have exactly one non-terminal symbol on the right-hand side
   B. A form in which all production rules have exactly one terminal symbol on the right-hand side
   C. A form in which all production rules have exactly two non-terminal symbols on the right-hand

side
D. None of the above
Answer: A

What is the purpose of a terminal symbol in a Context-Free Grammar?
A. To represent basic elements of the language
B. To represent non-terminal symbols
C. To specify production rules
D. None of the above
Answer: A

What is a rightmost derivation in a Context-Free Grammar?
A. A derivation in which the rightmost non-terminal symbol is always replaced in each step
B. A derivation in which the rightmost terminal symbol is always replaced in each step
C. A derivation in which the leftmost non-terminal symbol is always replaced in each step
D. A derivation in which the leftmost terminal symbol is always replaced in each step
Answer: A

What is the difference between a leftmost and rightmost derivation in a Context-Free Grammar?
A. The order in which the non-terminal symbols are replaced in each step
B. The order in which the terminal symbols are replaced in each step
C. The type of grammar being used
D. None of the above
Answer: A

Lec 32 - Trees

1. **What is the maximum number of nodes at level 4 in a binary tree?**
   a) 8
   b) 16
   c) 32
   d) 64
   Answer: b) 16

   Which of the following is not a binary tree traversal algorithm?
   a) Preorder
   b) Inorder
   c) Postorder
   d) Depth-first search
   Answer: d) Depth-first search

   Which of the following statements is true about a binary search tree?
   a) The left subtree of a node contains only nodes with keys greater than the node's key
   b) The right subtree of a node contains only nodes with keys less than the node's key
   c) The left and right subtrees of a node contain nodes with keys greater than and less than the node's key, respectively
   d) None of the above
   Answer: c) The left and right subtrees of a node contain nodes with keys greater than and less than the node's key, respectively

   A binary tree is said to be complete if:
   a) Every node has at most one child
   b) Every node has at least one child
   c) All levels of the tree are completely filled
   d) None of the above
   Answer: c) All levels of the tree are completely filled

   Which of the following is a self-balancing binary search tree?
   a) AVL tree
   b) B-tree
   c) Red-black tree
   d) All of the above
   Answer: d) All of the above

   Which of the following is not a common tree traversal algorithm?
   a) Breadth-first search
   b) Depth-first search
   c) Preorder traversal
   d) Level-order traversal
   Answer: d) Level-order traversal

   A full binary tree is a tree in which:
   a) Every node has at most one child
   b) Every node has at least one child
   c) All internal nodes have two children and all leaves have the same depth or level

d) None of the above
Answer: c) All internal nodes have two children and all leaves have the same depth or level

The height of a binary tree is defined as:
a) The number of nodes in the tree
b) The maximum number of nodes at any level in the tree
c) The maximum distance from the root node to any leaf node in the tree
d) None of the above
Answer: c) The maximum distance from the root node to any leaf node in the tree

Which of the following is not a type of binary tree?
a) Full binary tree
b) Complete binary tree
c) Perfect binary tree
d) Balanced binary tree
Answer: d) Balanced binary tree

Which of the following is not a tree traversal algorithm?
a) Depth-first search
b) Breadth-first search
c) Preorder traversal
d) Postorder search
Answer: d) Postorder search

Lec 33 - Polish Notation

1. **Which of the following is an example of Polish notation?**
   a) 3 + 4
   b) + 3 4
   c) 3 4 +
   d) 4 3 +
   Answer: b) + 3 4

   Polish notation is also known as:
   a) Infix notation
   b) Postfix notation
   c) Prefix notation
   d) None of the above
   Answer: c) Prefix notation

   In Polish notation, each operator is placed:
   a) After its operands
   b) Between its operands
   c) Before its operands
   d) None of the above
   Answer: c) Before its operands

   The expression "5 + 8 - 2" in Polish notation would be written as:
   a) + 5 8 2
   b) - 2 + 5 8
   c) - + 5 8 2
   d) None of the above
   Answer: c) - + 5 8 2

   Which of the following is an advantage of using Polish notation?
   a) It eliminates the need for operators
   b) It eliminates the need for parentheses
   c) It eliminates the need for operands
   d) None of the above
   Answer: b) It eliminates the need for parentheses

   The evaluation of Polish notation expressions is based on:
   a) Precedence rules
   b) Associativity rules
   c) A stack-based algorithm
   d) None of the above
   Answer: c) A stack-based algorithm

   The inventor of Polish notation was:
   a) John McCarthy
   b) Jan Lukasiewicz
   c) Alan Turing
   d) Claude Shannon
   Answer: b) Jan Lukasiewicz

   Which of the following programming languages uses Polish notation for function calls?
   a) Lisp

b) C++
c) Python
d) Java
Answer: a) Lisp

Which of the following is an example of a valid Polish notation expression?
a) + * 2 3 4
b) * 2 3 +
c) / 4 - 6 2
d) None of the above
Answer: a) + * 2 3 4

Which of the following is not an advantage of using Polish notation?
a) It is easily parsable by computers
b) It eliminates ambiguity in expressions
c) It allows for easy evaluation using a stack-based algorithm
d) It requires fewer keystrokes than infix notation
Answer: d) It requires fewer keystrokes than infix notation

Lec 34 - Total language tree

1. **What does a total language tree represent?**
   a) A subset of all possible strings generated by a CFG
   b) The starting symbol of a CFG
   c) All possible strings generated by a CFG
   d) The non-terminal symbols of a CFG
   Answer: c

   What do the nodes in a total language tree represent?
   a) The input strings generated by a CFG
   b) The production rules of a CFG
   c) The terminal symbols of a CFG
   d) The symbols of a CFG
   Answer: d

   What do the leaves of a total language tree represent?
   a) The starting symbol of a CFG
   b) The non-terminal symbols of a CFG
   c) The input strings generated by a CFG
   d) The terminal symbols of a CFG
   Answer: d

   How is a total language tree constructed?
   a) By applying the production rules of the grammar to the input strings
   b) By applying the production rules of the grammar to the starting symbol
   c) By applying the production rules of the grammar to the terminal symbols
   d) By applying the production rules of the grammar recursively to the symbols in the tree
   Answer: d

   What is the purpose of a total language tree?
   a) To generate input strings for a CFG
   b) To visualize the structure of a language generated by a CFG
   c) To simplify the production rules of a CFG
   d) To reduce the size of a CFG
   Answer: b

   Can a total language tree have multiple leaves?
   a) Yes, if the CFG generates multiple input strings
   b) No, it can only have one leaf
   c) It depends on the size of the CFG
   d) It depends on the length of the input string
   Answer: a

   What is the difference between a total language tree and a parse tree?
   a) They are the same thing
   b) A parse tree represents a single input string, while a total language tree represents all possible strings generated by a CFG
   c) A parse tree represents a subset of all possible strings generated by a CFG, while a total language tree represents all possible strings

d) A parse tree is used for regular languages, while a total language tree is used for context-free languages
Answer: b

What is the importance of the total language tree in parsing?
a) It helps to determine if a string is generated by a CFG
b) It helps to simplify the production rules of a CFG
c) It helps to reduce the size of a CFG
d) It helps to visualize the structure of the language generated by a CFG
Answer: d

Can a total language tree be infinite?
a) Yes, if the CFG generates an infinite number of input strings
b) No, it is always finite
c) It depends on the size of the CFG
d) It depends on the length of the input string
Answer: a

What is the time complexity of constructing a total language tree?
a) O(n)
b) O(log n)
c) O(n^2)
d) It depends on the size of the CFG and the length of the input string
Answer: d

Lec 35 - Null Production

1. **What is null production in a context-free grammar?**
   A) A production rule that generates a null string
   B) A production rule that generates a non-terminal symbol
   C) A production rule that generates a terminal symbol
   D) A production rule that generates a regular expression
   Answer: A

   What is the purpose of using null productions in a context-free grammar?
   A) To simplify the grammar by eliminating the need for additional productions
   B) To make the grammar more complex
   C) To increase the number of derivations for a given string
   D) To make the grammar more ambiguous
   Answer: A

   Which of the following is an example of a null production?
   A) A ? aB
   B) B ? ?
   C) S ? AB
   D) S ? aSb
   Answer: B

   What is the effect of a null production on the parse tree of a string?
   A) It adds a new subtree to the parse tree
   B) It removes a subtree from the parse tree
   C) It does not affect the parse tree
   D) It can lead to multiple parse trees for a given string
   Answer: B

   Can a context-free grammar have multiple null productions?
   A) Yes
   B) No
   Answer: A

   What is the relationship between null productions and the language generated by a context-free grammar?
   A) Null productions do not affect the language generated by a grammar
   B) Null productions can change the language generated by a grammar
   C) Null productions can only be used in regular languages
   D) Null productions are used to generate infinite languages
   Answer: B

   Which of the following is an example of a context-free grammar with null productions?
   S ? AB | ?
   A ? a
   B ? bB | ?
   A) { anbncm | n, m ? 0, 1 ? n ? m }
   B) { anbncn | n ? 0 }
   C) { anbmcn | n, m ? 0 }

D) { w ? { a, b }* | na(w) = nb(w) }
Answer: C

What is the difference between a null production and an empty string in a context-free grammar?
A) There is no difference between null production and empty string
B) Null production is a rule used in the derivation of a string, while an empty string is a string itself
C) An empty string is a non-terminal symbol, while null production is a terminal symbol
D) An empty string can only be used in regular grammars
Answer: B

How can ambiguity be introduced in a context-free grammar by using null productions?
A) By adding multiple null productions for the same non-terminal symbol
B) By adding null productions for all non-terminal symbols in the grammar
C) By using null productions in the production rules of a regular language
D) By removing null productions from the grammar
Answer: A

Which of the following statements is true about the Chomsky Normal Form (CNF) of a context-free grammar?
A) The CNF does not allow null productions
B) The CNF allows only null productions
C) The CNF allows both null and unit productions
D) The CNF only allows unit productions
Answer: A

Lec 36 - Chomsky Normal Form (CNF)

1. **Which of the following is true about Chomsky Normal Form (CNF)?**
   A) All nonterminal symbols can generate epsilon
   B) All nonterminal symbols can generate at most one terminal symbol
   C) All nonterminal symbols can generate at most two nonterminal symbols
   D) All nonterminal symbols can generate both terminal and nonterminal symbols
   Answer: C

   What is the benefit of converting a context-free grammar (CFG) to Chomsky Normal Form (CNF)?
   A) It eliminates all nonterminal symbols
   B) It makes the grammar more complex
   C) It simplifies parsing by removing ambiguity
   D) It increases the number of productions
   Answer: C

   Which of the following statements is true about Chomsky Normal Form (CNF) grammars?
   A) They are more expressive than regular grammars
   B) They are less expressive than context-free grammars
   C) They are equivalent in expressive power to context-free grammars
   D) They are only used for parsing programming languages
   Answer: C

   What is the form of the production rules in Chomsky Normal Form (CNF)?
   A) A ? aB
   B) A ? a
   C) A ? BC
   D) A ? ?
   Answer: C

   How many nonterminal symbols can appear on the right-hand side of a production rule in Chomsky Normal Form (CNF)?
   A) None
   B) One
   C) Two
   D) Three
   Answer: C

   What is the purpose of converting a CFG to Chomsky Normal Form (CNF)?
   A) To increase the number of productions
   B) To remove all terminal symbols
   C) To eliminate ambiguity in parsing
   D) To make the grammar more complex
   Answer: C

   Which of the following is an example of a production rule in Chomsky Normal Form (CNF)?
   A) A ? aB
   B) A ? B

C) A ? BC
D) A ? ?
Answer: C

Can every context-free grammar be converted to Chomsky Normal Form (CNF)?
A) Yes
B) No
Answer: A

Which of the following is not allowed in Chomsky Normal Form (CNF)?
A) Production rules with one nonterminal symbol and one terminal symbol
B) Production rules with only one nonterminal symbol
C) Production rules with more than two nonterminal symbols
D) Production rules with epsilon on the right-hand side
Answer: C

What is the advantage of Chomsky Normal Form (CNF) over other forms of context-free grammars?
A) It can handle regular languages
B) It has fewer production rules
C) It makes parsing more efficient
D) It can handle non-context-free languages
Answer: C

Lec 37 - A new format for FAs

1. **What is the new format for FAs called?**
   a) FANFA
   b) FABA
   c) FAZOO
   d) None of the above
   Answer: d) None of the above (name not provided in the description)

   What advantages does the new FA format offer?
   a) It can handle more complex languages and input sets
   b) It provides greater flexibility and efficiency
   c) It incorporates advanced algorithms for state minimization, language recognition, and error detection
   d) All of the above
   Answer: d) All of the above

   Who would benefit from using the new FA format?
   a) Developers looking to build sophisticated systems
   b) Novices learning to use FAs
   c) Both a) and b)
   d) None of the above
   Answer: c) Both a) and b)

   Does the new FA format have a simplified syntax?
   a) Yes
   b) No
   Answer: a) Yes

   How will the new FA format impact computational systems?
   a) It will increase efficiency and flexibility
   b) It will reshape the future of computational systems
   c) It will lead to the development of new systems
   d) All of the above
   Answer: b) It will reshape the future of computational systems

   Does the new FA format make use of advanced algorithms for error detection?
   a) Yes
   b) No
   Answer: a) Yes

   What is the primary purpose of FAs?
   a) To process information
   b) To store data
   c) To generate random numbers
   d) None of the above
   Answer: a) To process information

   Can FAs handle complex languages?
   a) Yes

b) No
Answer: a) Yes

What is the main benefit of the new FA format for novices?
a) It provides greater flexibility
b) It is easier to learn and use
c) It is more efficient than previous formats
d) None of the above
Answer: b) It is easier to learn and use

What is state minimization?
a) A process to optimize FA performance
b) A way to reduce the number of states in an FA
c) A technique for error detection in FAs
d) None of the above
Answer: b) A way to reduce the number of states in an FA

Lec 38 - Nondeterministic PDA

1. **What is the primary difference between deterministic pushdown automata (DPDA) and nondeterministic pushdown automata (NPDA)?**
   A. DPDA can have multiple possible transitions on the same input symbol.
   B. NPDA can have multiple possible transitions on the same input symbol.
   C. DPDA has a stack and an input tape, while NPDA only has a stack.
   D. NPDA has a stack and an input tape, while DPDA only has a stack.
   Solution: B

   Which of the following is true for an NPDA?
   A. It always accepts the input string if it has a valid path.
   B. It always rejects the input string if it has an invalid path.
   C. It may accept or reject the input string depending on the valid path.
   D. It always accepts the input string, regardless of the path.
   Solution: C

   Which of the following is a valid component of an NPDA?
   A. Input alphabet
   B. Stack alphabet
   C. Transition function
   D. All of the above
   Solution: D

   Can an NPDA have multiple start states?
   A. Yes
   B. No
   Solution: B

   Which of the following is true for an empty stack in an NPDA?
   A. It means the machine rejects the input string.
   B. It means the machine accepts the input string.
   C. It means the machine halts, but its acceptance or rejection is undefined.
   D. None of the above.
   Solution: B

   Which of the following is true for a language that can be recognized by an NPDA?
   A. It must be a regular language.
   B. It must be a context-free language.
   C. It must be a context-sensitive language.
   D. It can be any type of language.
   Solution: B

   Which of the following is not a valid operation for an NPDA?
   A. Push a symbol onto the stack
   B. Pop a symbol from the stack
   C. Read an input symbol
   D. Write an input symbol
   Solution: D

   Which of the following is true for a nondeterministic choice in an NPDA?
   A. It always leads to the acceptance of the input string.

B. It always leads to the rejection of the input string.
C. It may lead to the acceptance or rejection of the input string.
D. It does not affect the acceptance or rejection of the input string.
Solution: C

Which of the following is not a valid way to represent an NPDA?
A. A state transition diagram
B. A formal definition involving a 5-tuple of components
C. A context-free grammar
D. A computation tree
Solution: C

Which of the following is true for the time complexity of an NPDA?
A. It is always exponential.
B. It is always polynomial.
C. It can be either exponential or polynomial.
D. It is always constant.
Solution: C

Lec 39 - PDA corresponding to CFG

1. **Which of the following is true about PDAs and CFGs?**
   a) Every PDA corresponds to a CFG.
   b) Every CFG corresponds to a PDA.
   c) Some PDAs correspond to CFGs.
   d) PDAs and CFGs are not related.
   Solution: b) Every CFG corresponds to a PDA.

   Which of the following is a necessary component of a PDA?
   a) Finite set of states
   b) Input tape
   c) Transition function
   d) All of the above
   Solution: d) All of the above

   The stack in a PDA allows the PDA to:
   a) Store input symbols
   b) Store nonterminal symbols
   c) Store both input and nonterminal symbols
   d) None of the above
   Solution: b) Store nonterminal symbols

   The transition function in a PDA is based on:
   a) Current state
   b) Symbol on the input tape
   c) Symbol at the top of the stack
   d) All of the above
   Solution: d) All of the above

   Which of the following is necessary for a PDA to accept a string?
   a) It must reach an accepting state.
   b) It must have a nonempty stack.
   c) It must have a stack that contains only input symbols.
   d) It must have visited every state.
   Solution: a) It must reach an accepting state.

   Which of the following is true about PDAs and regular languages?
   a) PDAs can recognize all regular languages.
   b) PDAs cannot recognize any regular languages.
   c) PDAs can recognize some but not all regular languages.
   d) PDAs and regular languages are not related.
   Solution: a) PDAs can recognize all regular languages.

   The complement of a context-free language is:
   a) Always context-free.
   b) Always regular.
   c) Always non-context-free.
   d) None of the above.
   Solution: c) Always non-context-free.

   The language {0^n1^n | n ? 0} is:
   a) Context-free but not regular.

b) Regular but not context-free.
c) Both context-free and regular.
d) Neither context-free nor regular.
Solution: a) Context-free but not regular.

Which of the following is true about PDAs and CFGs?
a) PDAs can recognize all languages generated by CFGs.
b) PDAs can recognize some but not all languages generated by CFGs.
c) PDAs can recognize no languages generated by CFGs.
d) PDAs and CFGs are not related.
Solution: a) PDAs can recognize all languages generated by CFGs.

Which of the following is true about PDAs and deterministic PDAs (DPDAs)?
a) PDAs are always non-deterministic.
b) DPDAs are always non-deterministic.
c) PDAs can be either deterministic or non-deterministic.
d) PDAs and DPDAs are not related.
Solution: c) PDAs can be either deterministic or non-deterministic.

Lec 40 - Conversion form of PDA

1. **Which of the following is true about the conversion from a CFG to a PDA?**
   a) It is always possible to convert any CFG to an equivalent PDA.
   b) It is not possible to convert any CFG to an equivalent PDA.
   c) The resulting PDA will have fewer states than the original CFG.
   d) The resulting PDA will have more states than the original CFG.
   Answer: a

   What is the purpose of converting a CFG to a PDA?
   a) To reduce the number of rules in the grammar.
   b) To make it easier to parse input strings.
   c) To recognize the same language as the CFG.
   d) To improve the efficiency of the parsing algorithm.
   Answer: c

   Which of the following is true about the stack used by the PDA?
   a) It can only contain terminal symbols.
   b) It can only contain nonterminal symbols.
   c) It can contain both terminal and nonterminal symbols.
   d) It does not play a role in the conversion process.
   Answer: c

   Which type of PDA is used for the conversion from a CFG?
   a) Deterministic PDA (DPDA)
   b) Non-deterministic PDA (NPDA)
   c) Both DPDA and NPDA can be used
   d) None of the above
   Answer: b

   Which of the following is true about the acceptance condition of the PDA?
   a) The PDA must reach the final state to accept the input.
   b) The PDA must reach the final state and the stack must be empty to accept the input.
   c) The PDA must reach the final state and the stack must contain at least one symbol to accept the input.
   d) The PDA must reach the final state and the stack must contain only terminal symbols to accept the input.
   Answer: b

   Which of the following is NOT a step in the conversion process?
   a) Create a start state and a final state for the PDA.
   b) Create a transition for each rule in the CFG.
   c) Assign each nonterminal symbol to a unique state in the PDA.
   d) Remove all nonterminal symbols from the grammar.
   Answer: d

   What is the purpose of the transition function in the PDA?
   a) To move to a new state based on the current input symbol and the top symbol on the stack.
   b) To generate new symbols to add to the stack.
   c) To remove symbols from the stack.

d) To determine whether the input string is valid or not.
Answer: a

Which of the following is true about the number of transitions in the PDA?
a) The number of transitions is always equal to the number of rules in the grammar.
b) The number of transitions can be greater or less than the number of rules in the grammar.
c) The number of transitions is always less than the number of rules in the grammar.
d) The number of transitions is not related to the number of rules in the grammar.
Answer: b

Which of the following is true about the conversion from a CFG to a PDA?
a) It can only be done for regular languages.
b) It can only be done for context-free languages.
c) It can be done for any formal language.
d) It cannot be done for any formal language.
Answer: b

Which of the following is true about the role of the stack in the PDA?
a) It is used to keep track of the input symbols.
b) It is used to keep track of the state of the PDA.
c) It is used to keep track of the nonterminal symbols in the input string.
d) It is not used in the conversion process

Lec 41 - Non-Context-Free language

1. **Which of the following languages is non-context-free?**
   a) {a^n b^n c^n | n ? 1}
   b) {a^n b^n | n ? 1}
   c) {a^n b^m c^n | n, m ? 1}
   d) {a^n b^m c^k | n ? m or m ? k}
   Solution: a) {a^n b^n c^n | n ? 1}

   Which of the following grammars can generate non-context-free languages?
   a) Regular grammar
   b) Context-free grammar
   c) Context-sensitive grammar
   d) Unrestricted grammar
   Solution: c) Context-sensitive grammar and d) Unrestricted grammar

   Which of the following is an example of a non-context-free language?
   a) The language of regular expressions
   b) The language of context-free grammars
   c) The language of Turing machines
   d) The language of palindromes
   Solution: d) The language of palindromes

   Which of the following is an example of a context-sensitive grammar?
   a) S ? aSb | ?
   b) S ? aB | bA
   A ? aAa | ?
   B ? bBb | ?
   c) S ? AB
   A ? aAa | ?
   B ? bBb | ?
   d) S ? aSb | ?
   S ? bSa | ?
   Solution: c) S ? AB, A ? aAa | ?, B ? bBb | ?

   Which of the following is true about non-context-free languages?
   a) They can be recognized by a finite automaton.
   b) They can be generated by a regular grammar.
   c) They can be generated by a context-free grammar.
   d) They require more powerful formalisms than context-free grammars.
   Solution: d) They require more powerful formalisms than context-free grammars.

   Which of the following is an example of a non-context-free language?
   a) The language of all strings that contain an equal number of 0s and 1s
   b) The language of all strings that contain at least two consecutive 1s
   c) The language of all strings that are palindromes
   d) The language of all strings that begin and end with the same symbol
   Solution: c) The language of all strings that are palindromes

   Which of the following is an example of a context-sensitive grammar?
   a) S ? aSb | ?

b) S ? AB
A ? aAa | ?
B ? bBb | ?
c) S ? aAaBb | bBbAa
A ? aA | ?
B ? bB | ?
d) S ? aBc | Bc
B ? bB | ?
Solution: c) S ? aAaBb | bBbAa, A ? aA | ?, B ? bB | ?

Which of the following is true about the Chomsky hierarchy?
a) Non-context-free languages are a subset of context-free languages.
b) Context-free languages are a subset of regular languages.
c) Regular languages are a subset of non-context-free languages.
d) Unrestricted languages are a subset of context-sensitive languages.
Solution: b) Context-free languages are a subset of regular languages.

Which of the following is an example of a non-context-free language?
a) The language of all strings of the form a^nb^n
b) The language of all strings of the form a^nb^

Lec 42 - Pumping lemma for CFLs

1. **What is the pumping lemma for context-free languages?**
   A) A tool used to generate context-free languages
   B) A tool used to prove that a language is context-free
   C) A tool used to prove that a language is not context-free
   D) A tool used to recognize context-free languages
   Answer: C

   Which of the following statements is true about the pumping lemma for context-free languages?
   A) It only works for regular languages
   B) It only works for context-sensitive languages
   C) It can be used to prove that a language is context-free
   D) It can be used to recognize context-free languages
   Answer: C

   What is the purpose of the pumping lemma for context-free languages?
   A) To generate context-free languages
   B) To recognize context-free languages
   C) To prove that a language is context-free
   D) To prove that a language is not context-free
   Answer: D

   Which of the following is a requirement for the pumping lemma for context-free languages to be applied?
   A) The language must be regular
   B) The language must be context-free
   C) The language must be context-sensitive
   D) The language must be unrestricted
   Answer: B

   What is the meaning of the 'pumping length' in the pumping lemma for context-free languages?
   A) The minimum length of a string in the language
   B) The maximum length of a string in the language
   C) A constant n such that any string in the language with length greater than n can be pumped
   D) A constant n such that any string in the language with length less than n can be pumped
   Answer: C

   Which of the following is a requirement for the decomposition of a string in the pumping lemma for context-free languages?
   A) |vxy| ? n
   B) |vxy| ? n
   C) |vy| ? n
   D) |vy| ? n
   Answer: A

   What is the purpose of the pumping lemma for context-free languages in theoretical computer science?
   A) To generate context-free languages

B) To recognize context-free languages
C) To prove properties of context-free languages
D) To prove that context-free languages are more powerful than regular languages
Answer: C

Which of the following is a true statement about the pumping lemma for context-free languages?
A) It can be used to recognize any language
B) It can be used to recognize any regular language
C) It can be used to recognize any context-free language
D) It can be used to recognize any context-sensitive language
Answer: C

What is the minimum value for the pumping length in the pumping lemma for context-free languages?
A) 0
B) 1
C) 2
D) There is no minimum value
Answer: B

Which of the following is a true statement about the pumping lemma for context-free languages?
A) It can be used to prove that any language is context-free
B) It can be used to prove that any regular language is context-free
C) It can be used to prove that any context-free language is not regular
D) It can be used to prove that any context-free language is context-sensitive
Answer: C

Lec 43 - Decidablity

1. **Which of the following is an example of an undecidable problem?**
   a) Determining if a given number is prime
   b) Sorting a list of integers in ascending order
   c) Calculating the square root of a number
   d) Counting the number of vowels in a string
   Answer: a) Determining if a given number is prime

   Which of the following problems is decidable?
   a) The halting problem
   b) The subset sum problem
   c) The traveling salesman problem
   d) The knapsack problem
   Answer: b) The subset sum problem

   Which of the following is a necessary condition for a problem to be decidable?
   a) The problem must have a finite number of inputs
   b) The problem must have a finite number of outputs
   c) There must exist an algorithm that can solve the problem
   d) The problem must be solvable in polynomial time
   Answer: c) There must exist an algorithm that can solve the problem

   Which of the following is a sufficient condition for a problem to be undecidable?
   a) The problem can be solved by a non-deterministic algorithm
   b) The problem can be solved in exponential time
   c) The problem can be reduced to the halting problem
   d) The problem has an infinite number of inputs
   Answer: c) The problem can be reduced to the halting problem

   Which of the following problems is undecidable?
   a) Testing if a context-free grammar generates a given language
   b) Finding the shortest path in a graph
   c) Determining if a given number is even or odd
   d) Calculating the sum of two integers
   Answer: a) Testing if a context-free grammar generates a given language

   Which of the following problems is semi-decidable?
   a) The halting problem
   b) The subset sum problem
   c) The traveling salesman problem
   d) The knapsack problem
   Answer: a) The halting problem

   Which of the following is true about semi-decidable problems?
   a) They are always decidable
   b) They are always undecidable
   c) They can be partially solved by an algorithm
   d) They cannot be solved by any algorithm
   Answer: c) They can be partially solved by an algorithm

   Which of the following is an example of a semi-decidable problem?
   a) Testing if a given regular expression matches a given string

b) Sorting a list of integers in descending order
c) Finding the longest common subsequence between two strings
d) Checking if a given context-free grammar is ambiguous
Answer: a) Testing if a given regular expression matches a given string

Which of the following problems is not decidable in general, but is decidable for certain special cases?
a) The subset sum problem
b) The traveling salesman problem
c) The halting problem
d) The knapsack problem
Answer: b) The traveling salesman problem

Which of the following statements is true about undecidable problems?
a) They cannot be solved by any algorithm
b) They can be solved in exponential time
c) They have an infinite number of inputs
d) They are always semi-decidable
Answer: a) They cannot be solved by any algorithm

Lec 44 - Parsing Techniques

1. **Which of the following is NOT a parsing technique?**
   a) Top-down parsing
   b) Bottom-up parsing
   c) Recursive descent parsing
   d) Infix parsing
   Answer: d) Infix parsing

   Which parsing technique starts at the root of the parse tree and works downwards towards the leaves?
   a) Top-down parsing
   b) Bottom-up parsing
   c) Recursive descent parsing
   d) LR parsing
   Answer: a) Top-down parsing

   Which parsing technique starts at the leaves of the parse tree and works upwards towards the root?
   a) Top-down parsing
   b) Bottom-up parsing
   c) Recursive descent parsing
   d) SLR parsing
   Answer: b) Bottom-up parsing

   Which parsing technique uses a stack to keep track of the symbols in the input and the rules of the grammar?
   a) Top-down parsing
   b) Bottom-up parsing
   c) Recursive descent parsing
   d) LALR parsing
   Answer: b) Bottom-up parsing

   Which parsing technique is most commonly used in compilers and language processing tools?
   a) Top-down parsing
   b) Bottom-up parsing
   c) Recursive descent parsing
   d) LR parsing
   Answer: d) LR parsing

   Which parsing technique can handle left-recursive grammars?
   a) Top-down parsing
   b) Bottom-up parsing
   c) Recursive descent parsing
   d) Earley parsing
   Answer: d) Earley parsing

   Which parsing technique is a type of top-down parsing that uses a predictive parsing table?
   a) LL parsing

b) SLR parsing
c) LALR parsing
d) LR parsing
Answer: a) LL parsing

Which parsing technique is a type of bottom-up parsing that uses a canonical LR(1) parser?
a) LL parsing
b) SLR parsing
c) LALR parsing
d) CLR parsing
Answer: d) CLR parsing

Which parsing technique is a type of top-down parsing that uses recursive function calls to build the parse tree?
a) LL parsing
b) SLR parsing
c) Recursive descent parsing
d) LR parsing
Answer: c) Recursive descent parsing

Which parsing technique is capable of handling ambiguous grammars?
a) LL parsing
b) SLR parsing
c) LALR parsing
d) GLR parsing
Answer: d) GLR parsing

Lec 45 - Turing machine

1. **What is a Turing machine?**
   a) A type of computer hardware
   b) A theoretical computing machine
   c) A programming language
   d) An operating system
   Answer: b

   Who invented the Turing machine?
   a) Bill Gates
   b) Steve Jobs
   c) Alan Turing
   d) Charles Babbage
   Answer: c

   What is the tape in a Turing machine?
   a) A storage device
   b) A memory unit
   c) A type of input device
   d) A linear sequence of cells that can hold symbols
   Answer: d

   What is the read/write head in a Turing machine?
   a) A sensor that reads data from the tape
   b) A laser that writes data onto the tape
   c) A mechanical arm that moves the tape
   d) A device that can read or write symbols on the tape
   Answer: d

   What is the finite control in a Turing machine?
   a) A software program that controls the machine
   b) A device that limits the amount of time the machine can run
   c) A set of rules that determine the next action based on the current state and input symbol
   d) A mechanism that prevents the machine from overheating
   Answer: c

   What are the actions that a Turing machine can take?
   a) Moving the read/write head, writing a symbol, or changing the state
   b) Running a program, opening a file, or sending an email
   c) Printing a document, copying a file, or deleting a folder
   d) None of the above
   Answer: a

   Can a Turing machine solve any problem that can be solved algorithmically?
   a) Yes
   b) No
   Answer: a

   Are there any problems that cannot be solved by a Turing machine?
   a) Yes

b) No
Answer: a

What is the significance of the halting problem in the context of Turing machines?
a) It demonstrates the limitations of computing machines
b) It is an example of an algorithm that cannot be solved by a Turing machine
c) It is a problem that Turing machines can solve easily
d) None of the above
Answer: a

What is the Church-Turing thesis?
a) It states that all problems that can be solved algorithmically can be solved by a Turing machine
b) It is a theorem that proves the existence of Turing machines
c) It is a programming language designed for Turing machines
d) None of the above
Answer: a