

Fill in the Blanks

1. Grammar consists of four tuplesSet of non-terminals.....set of production rule, and
2. According to the Chomsky hierarchy, there aretypes of grammars.
3. Type 1 grammar is called.....
4. Type 2 grammar is called.....
5. According to the Chomsky hierarchy, regular grammar is type.....grammar.
6. All languages are accepted by.....
7. The machine format of context-free language is.....
8. Linear bounded automata is the machine format of
9. The machine format of type 3 language is.....

10. Grammar where production rules are in the format is..... grammar
11. In a context-free grammar at the left hand side, there is.....non-terminal.
12. Type 3 language is called.....
13. $a^n b^n c^n$ is an example of.....language in particular.
14. The grammar $S \rightarrow aSb/A, A \rightarrow Ac/c$ is an example ofgrammar in particular.
15. The grammar $S \rightarrow Abc/ABSc, BA \rightarrow AB, Bb \rightarrow bb, A \rightarrow a$ is an example of grammar.....in particular.
16. The grammar $A \rightarrow aA/bB/a/b, B \rightarrow bB/b$ is an example of.....grammar in particular.
17. The language $a^*(a + b)b^*$ is an example of

.....language in particular.

Answer the question above sentence

1. set of terminals, start symbol
2. Four
3. Context-sensitive grammar
4. Context-free grammar
5. Three 6. Turing machine
7. Push down automata
8. Context-sensitive grammar
9. Finite automata
10. Context-sensitive
11. Single
12. Regular expression
13. Context-sensitive
14. Context-free

15. Context-sensitive
16. Regular grammar
17. Type 4

Find the languages generated by the following grammars

- a) $S \rightarrow aSb/A, A \rightarrow Ac/c$
- b) $S \rightarrow aSb/aAb, A \rightarrow Ac/e$
- c) $S \rightarrow aSb/aAb, A \rightarrow bA/b$
- d) $S \rightarrow S1/S2, S1 \rightarrow 0S11/0A, A \rightarrow 0A/, S2 \rightarrow 0S21/B1, B \rightarrow B1/e$
- e) $S \rightarrow AB/CD, A \rightarrow aA/a, B \rightarrow bB/bC, C \rightarrow cD/d, D \rightarrow aD/AD$

Justify your answer for this.

- f) $S \rightarrow AA, A \rightarrow BS, A \rightarrow b, B \rightarrow SA, B \rightarrow a$
- g) $E \rightarrow E + E \mid E \text{ menhha } E \mid E * E \mid E/E \mid \text{id}$

Construct a grammar for the following languages.

a) $L = \text{tohi}$

b) $L = (a, b)^*$, where all 'a' appears before 'b'

c) $L = (a, b)^*$, where all 'b' appears before 'a'

d) $L = (a, b)^*$, where there are equal number of 'a' and 'b'

e) $L = (a, b)^*$, where ab and ba appear in an alternating sequence.

f) $L = (a, b)^*$, where the number of 'b' is one more than the number of 'a'

g) $L = (a, b)^*aa(a, b)^*$

Construct a grammar for the following languages.

a) $L = \text{ambn}$, where m not equal to n.

b) $L = \text{axbycz}$, where $y = x + z$

c) $L = \text{axbycz}$, where $z = x + y$

- d) $L = axbycz$, where $x = y + z$
- e) $L = \text{Set of all string over } a, b \text{ containing } aa \text{ or } bb \text{ as substring}$
- f) $L = \text{Set of all string over } a, b \text{ containing at least two 'a'}$
- g) $L = \text{Set of all string over } 0, 1 \text{ containing } 011 \text{ as substring}$

Construct a grammar for the following languages.

- a) $anbn \mid n \geq 0$ u $cmdm \mid m \geq 0$
- b) $anbn \mid n \geq 0$ u $ambm \mid m \geq 0$
- c) $axbycz$, where $x = y + z$ u $L = axbycz$, where $z = x + y$

Construct a grammar for the following languages and find the type of the grammar in particular

- a) $L = (0 + 1)^* 11 (11)^*$

b) $L = (\text{Set of all string of 'a', 'b' beginning and ending with 'a' })$

c) $L = a^{2n+1}$, where $n \geq 0$

in the name of god

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Introduction to Automata Theory, Formal
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