Concepts of Context-Free Languages (CFLs) and Context-Free Grammars (CFGs)

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1. A Context-Free Language (CFL) is a language that:
(1 Point)

- ◯ can be represented by a Context-Free Grammar (CFG)
- ◯ can only be represented by a Context-Free Grammar (CFG)

2. The language of the strings with sequences of 0's followed by sequences of 1's and with the same number of 0's and 1's is:
(1 Point)

- ◯ a Context-Free Language (CFL), but can be represented by a regular expression
- ◯ a Context-Free Language (CFL) and cannot be represented by a regular expression

3. Consider the following CFG:
   A -> AB | B
   B -> b
   What is the leftmost derivation for the input string bbb:
   (1 Point)

   - ◯ A => AB => ABB => BBB => bBB => bbB =>bbb
   - ◯ A => AB => Ab => ABb => Abb => Bbb=> bbb

4. A CFG G is said to be ambiguous when:
   (1 Point)

   - ◯ its CFL, L(G), is ambiguous
   - ◯ there is at least one string in L(G) that has two or more syntax trees
   - ◯ there are leftmost and rightmost derivations of each string w in L(G)
   - ◯ there is a doubt about if a string w is in L(G)

5. Is the following CFG:
   A -> AB | B
   B -> b
   ambiguous?
   (1 Point)

   - ◯ YES
   - ◯ NO

6. Suppose the ambiguous grammar G1:
   E -> I | E+E | E×E | (E)
   I -> a | b | Ia | Ib | I0 | I1
   and the following non-ambiguous grammar G2:
   E -> I | E+I | E×I | (E)
   I -> a | b | Ia | Ib | I0 | I1
   Is L(G1) = L(G2)?
   (1 Point)

   ◯ YES

   ◯ NO

7. Suppose the ambiguous grammar G1:
   E -> I | E+E | E×E | (E)
   I -> a | b | Ia | Ib | I0 | I1
   and the following non-ambiguous grammar G3:
   E -> J | E×J
   J -> I | J+I
   I -> a | b | Ia | Ib | I0 | I1 | (E)
   Is L(G1) = L(G3)?
   (1 Point)

   ◯ TRUE

   ◯ FALSE

8. Any ambiguous CFG can be modified to a non-ambiguous CFG (representing the same language): (1 Point)

- ◯ Only if the language of the ambiguous CFG is not an ambiguous language
- ◯ Always

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