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CMSC330

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Homework1

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| Homework 1 | | |
| Instructions |  | |
| 1. Write a grammar that generates strings that contain matched brackets and parentheses. Examples of valid strings are: 2. [([])] 3. ()()[[]]   [[]][()]()  Examples of invalid strings are:  [}  [[]  ()())  ][()   1. Given the following grammar:   <sentence> -> <left> **a** <right> **b** <left> -> <left> **b** | **b** <right> -> **a** <right> | **a**  Indicate which of the following strings are valid according to this grammar. For those that are valid, construct the parse tree.   * 1. baab   2. bbbaaaaab   3. bbbab   4. aabab   5. bbbaaabb   In English, describe the strings generated by this grammar as specifically as possible. | | |

Answers:

**Bottom of Form1:**

I believe the below Grammar using <Item> as an abstraction for Brackets and Parentheses allows all the examples to be generated.

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| <List> --> | <item> | <List> | | | <List> |

<Item> --> <Brackets> <item> | <Parenthesis> <item> | <Brackets> <Parenthesis> | <Brackets> | <Parenthesis>

<Brackets> --> [ <item> ] | [ ]

<Parenthesis> --> ( <item> ) | ( )

**2:**

1. baab (good)
2. bbbaaaaab (good)
3. bbbab (Bad doesn’t have second a)
4. aabab (Doesn’t start with b)
5. bbbaaabb (Bad, doesn’t end with aab)

Due to Sentence -> Left -> b, the string will always start with b.

Due to <sentence> -> <left> a <right> b, the string will always end with aab

Due to <sentence> not referencing itself you will only have two initial paths a <left> | <right> paths. Once you start one of these paths you can continue <left> -> <left> as many times as you want, but you can never “cross the streams”. You should never see <left> -> <right> | <right> -> <left>

There will be a minimum of 2 a’s and 2 b’s because <left> -> b and right -> a, and sentence references a and b explicitly, as well as <left> and <right>