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CSC344 Programming Languages

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BNF Assignment:

Abstract: This assignment is all about BNF. This assignment gives provides practice as it asks us to compose some BNF grammars for given languages, draw some BNF parse trees and be asked to describe BNF in English in a straightforward compelling manner. Overall the goal of this assignment is to help you compose parse trees and understand BNF grammar and be able to explain it.

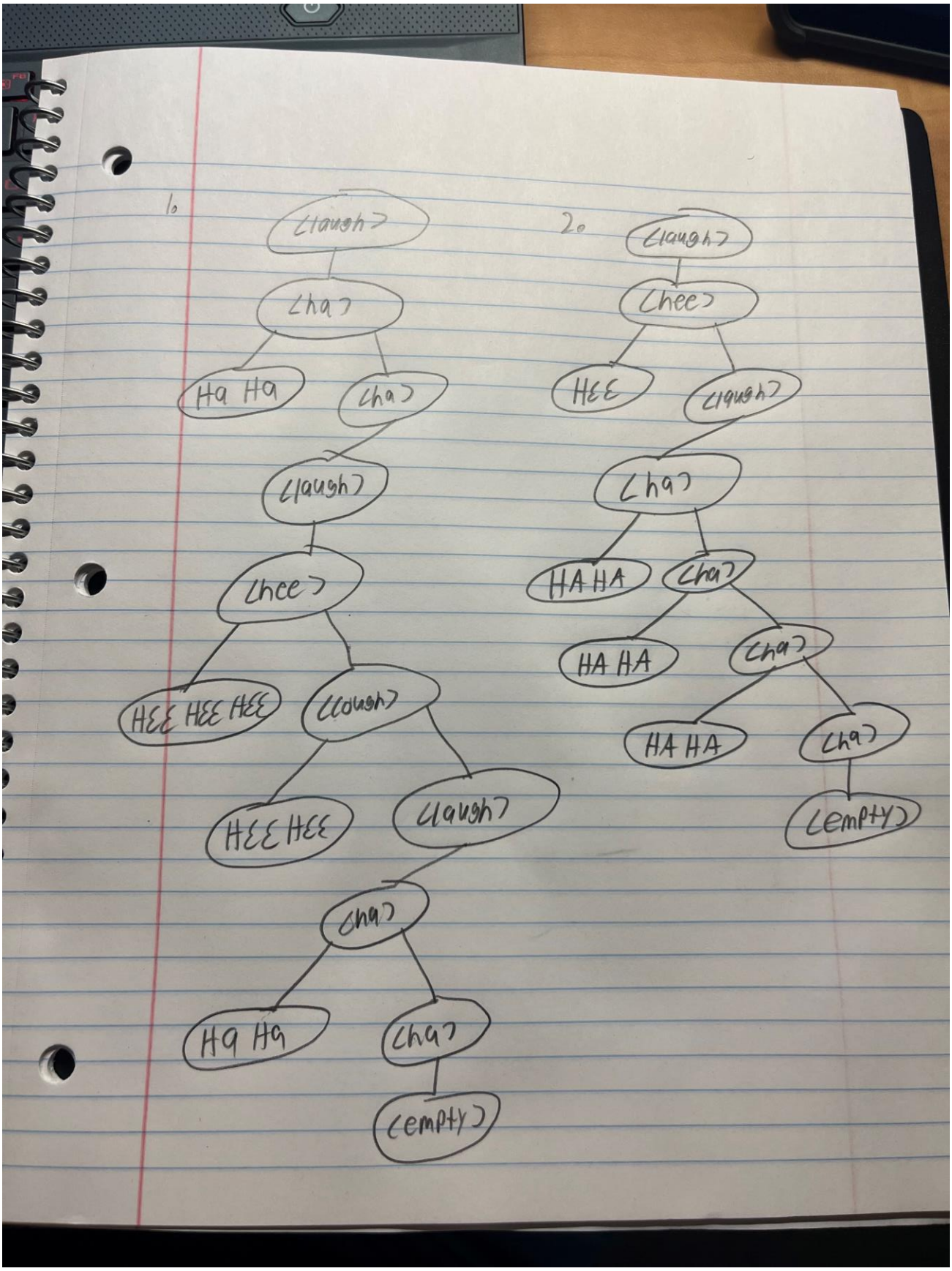
Problem 1 – Laughter

<laugh> ::= <ha> | <hee> | <empty>

<ha> ::= HA HA <ha> | <laugh> | <empty>

<hee> ::= HEE <cough> | HEE HEE HEE <cough> | HEE <empty>

<cough> ::= HEE HEE <laugh> | <laugh>


1.
<laugh>
<ha>
Ha Ha
<ha>
<laugh>
<hee>
HEE HEE HEE
<cough>
HEE HEE
<laugh>
<ha>
Ha Ha
<ha>
<empty>
2.
<laugh>
<hee>
HEE
<laugh>
<ha>
HA HA
<ha>
HA HA
<ha>
HA HA
<ha>
<empty>

Problem 2 – SQN

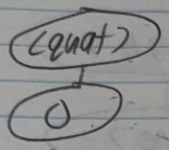
<quat> ::= 0 | <notzero> 0 | <notzero>

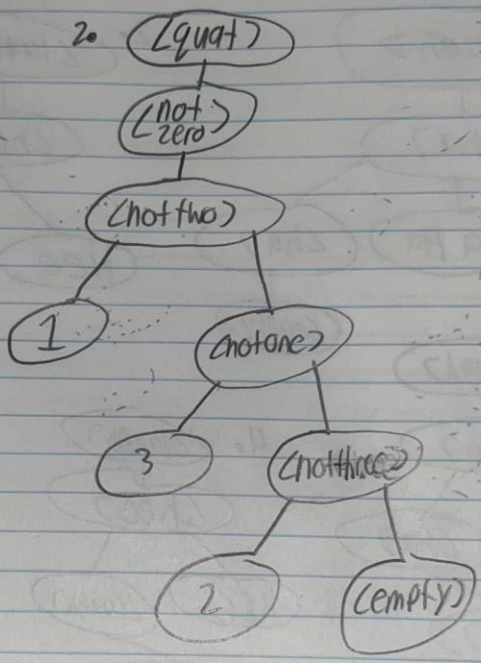
<notzero> ::= <notthree> | <nottwo> | <notone>

<notone> ::= 0 <notzero> | 2 <notwo> | 3 <notthree> | <empty>

<nottwo> ::= 0 <notzero> | 1 <notone> | 3 <notthree> | <empty>

<notthree> ::= 0 <notzero> | 1 <notone> | 2 <nottwo> | <empty>

1. 

2. 

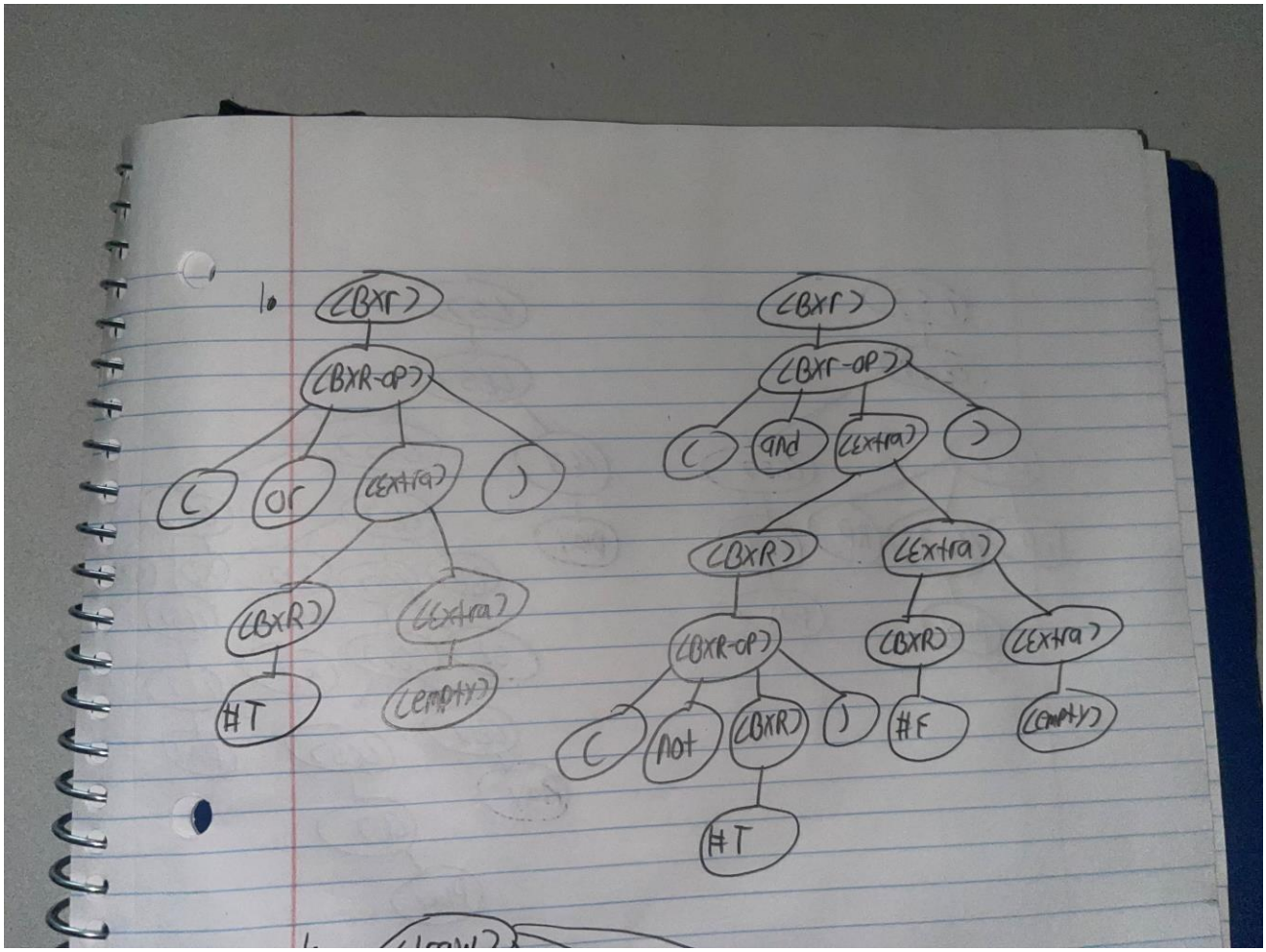
4. Drawing a parse tree consistent with the constructed BNF grammar for the string 1223 is not possible because the productions are designed specifically to make it impossible to have two or more adjacent occurrences.

Problem 3 – BXR

<BXR> ::= <BXR-op> | #f | #t | <empty>

<BXR-op> ::= (not <BXR>) | (or <Extra>) | (and <Extra>)

<Extra> ::= <BXR> <Extra> | <empty>



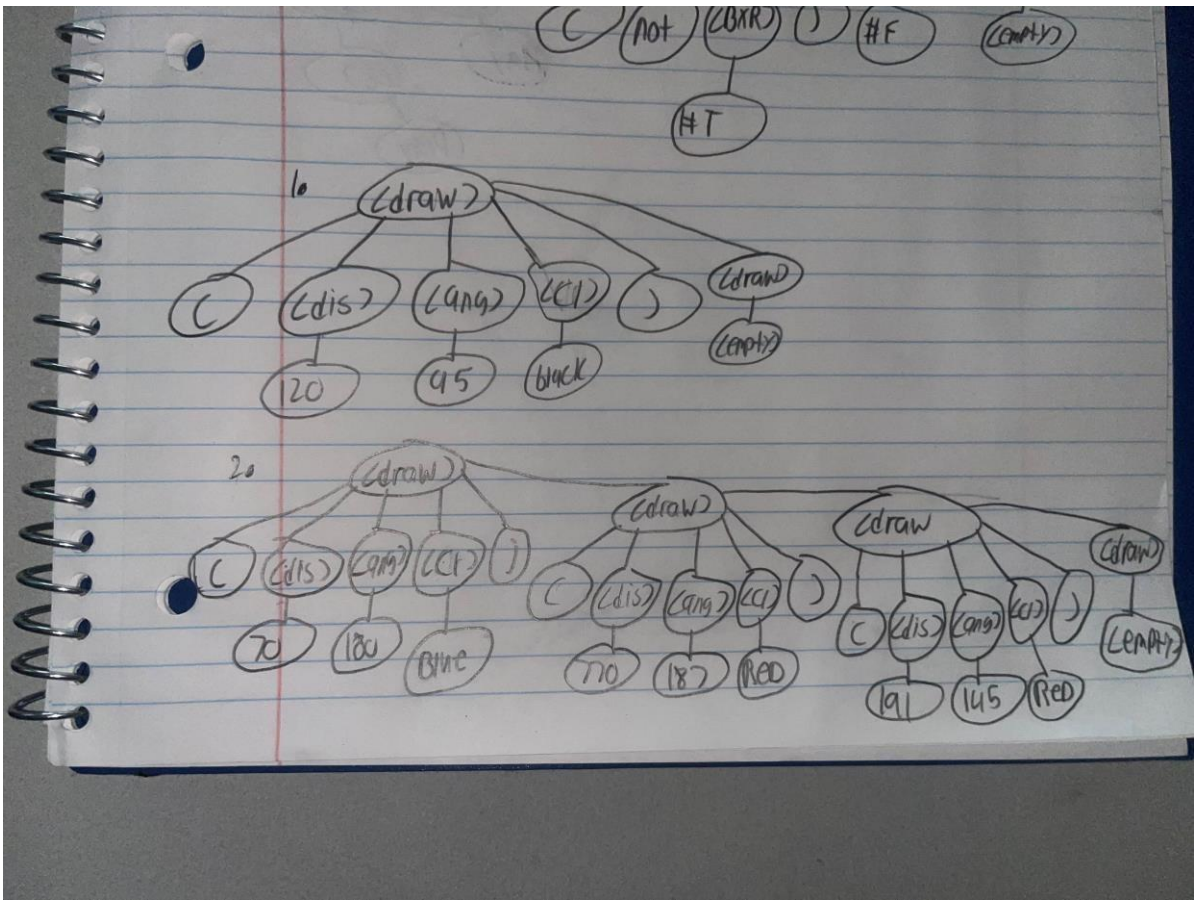
Problem 4 – LSS

<draw> ::= (<dis> <ang> <cl>) <draw> | <empty>

<dis> :: = Distance#

<ang>::= Angle#

<cl> ::= RED | BLUE | BLACK

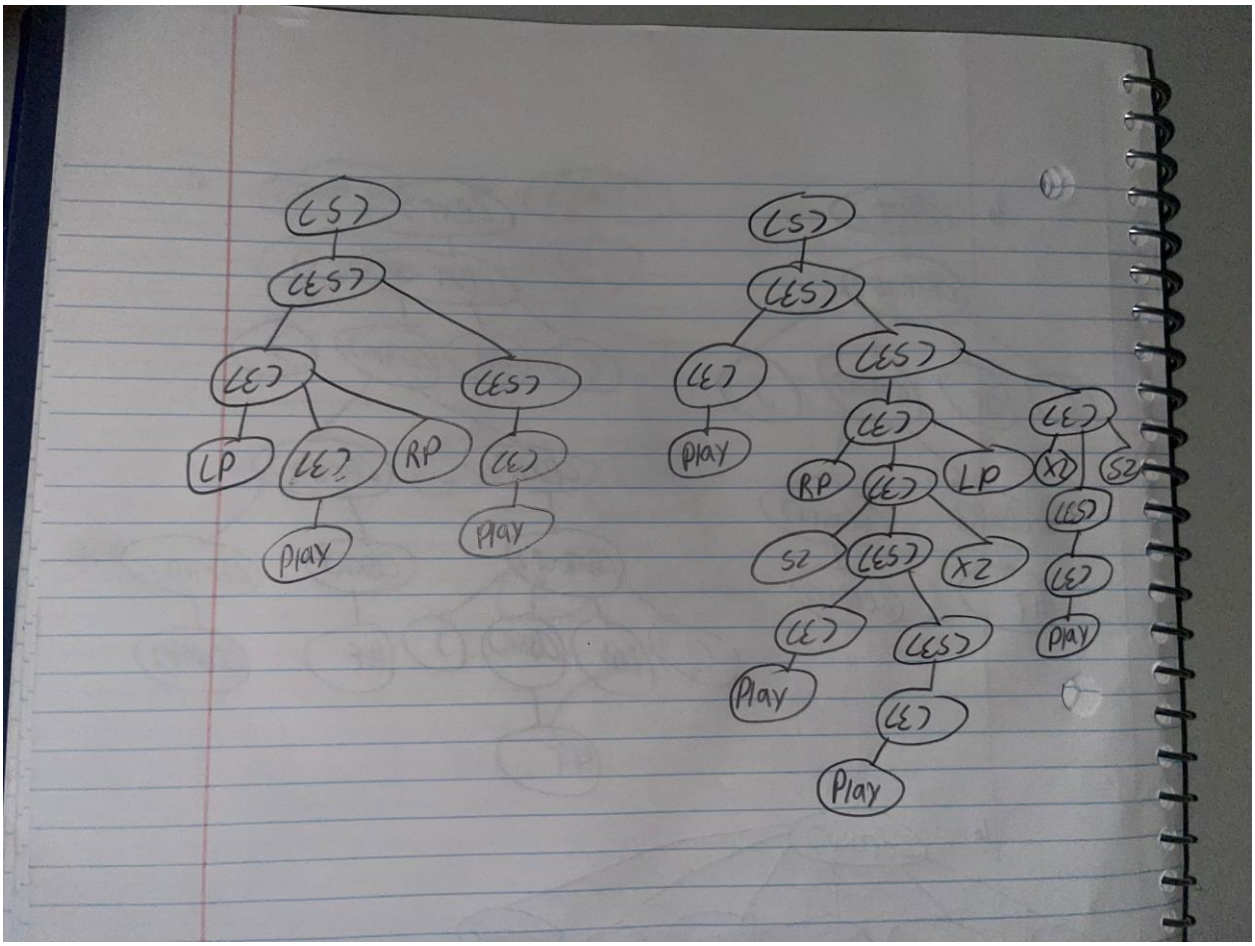


Problem 5 – M-Lines

<S> ::= <ES> | <empty>

<ES> ::= <E> | <E> <ES>

<E> ::= PLAY | REST | RP <ES> LP | LP <ES> RP | S2 <ES> X2 | X2 <ES> S2 | X3 <ES> S3 | S3 <ES> X3 | X2 <ES> X2



Problem 6 – BNF?

BNF is a type of context-free grammar, and it is also an abbreviation for Backus Naur form. BNF consists of four major parts which are tokens, nonterminals, productions, and a start symbol. BNF boils down to a grammar that can be used to define a language with precision.