

BNF ASSIGNMENT

Learning Abstract:

In this assignment, I compiled BNF grammars in the form of shapes, arithmetic expressions, color outcomes and came up with a simple meaning explanation for what BNF was in English. I was challenged with problem sets that require having the grammar descriptions that correlates with the parse trees generated.

Problem 1: Shapes

$\langle \text{shapes} \rangle ::= ((\langle \text{sizes} \rangle) (\langle \text{colors} \rangle) (\langle \text{patterns} \rangle) (\langle \text{shape} \rangle))$

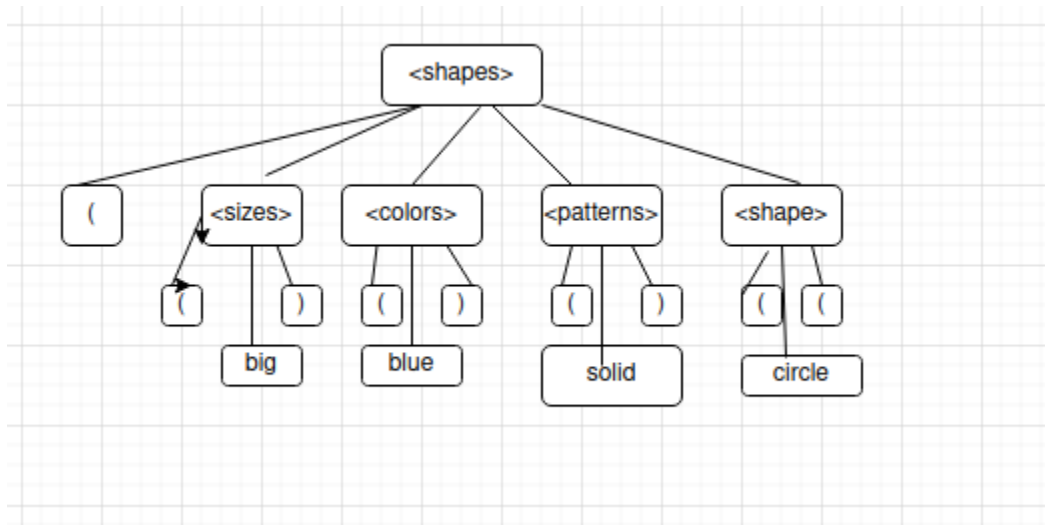
$\langle \text{sizes} \rangle ::= \text{large} \mid \text{big} \mid \text{medium} \mid \text{small}$

$\langle \text{colors} \rangle ::= \text{red} \mid \text{blue} \mid \text{yellow}$

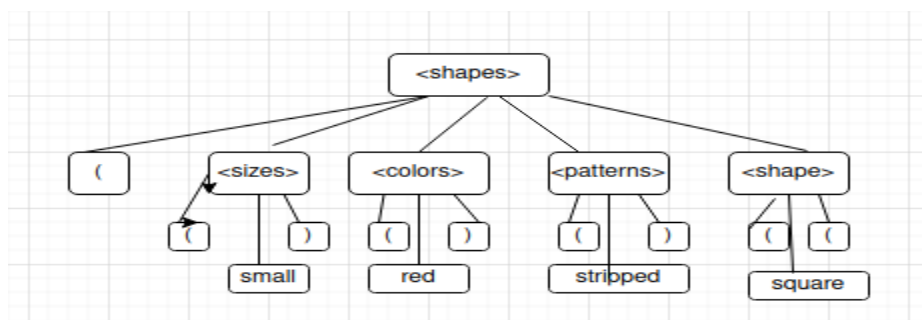
$\langle \text{patterns} \rangle ::= \text{stripped} \mid \text{dotted} \mid \text{solid}$

$\langle \text{shape} \rangle ::= \text{circle} \mid \text{square} \mid \text{triangle}$

1. Parse Tree



2. Parse Tree



Problem 2-SQN (Special Quaternary Numbers)

NZN-Non-zero number

QO=quaternary Order

QOS=Quaternary Orders

$\langle \text{QN} \rangle ::= 0 \mid \langle \text{NZN} \rangle \mid \langle \text{QOS} \rangle$

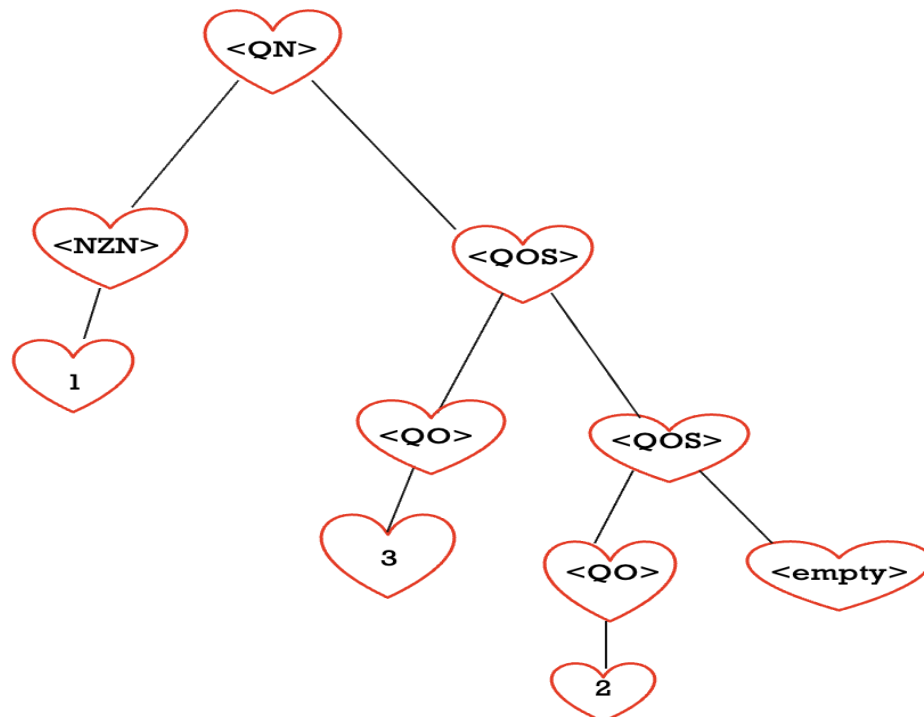
$\langle \text{QOS} \rangle ::= \langle \text{empty} \rangle \mid \langle \text{QO} \rangle \mid \langle \text{QOS} \rangle$

$\langle \text{QO} \rangle ::= 0 \mid 1 \mid 2 \mid 3$

a)



b)



c) They are not BNF grammar because it has two adjacent occurrences on the same quaternary digits.

Problem 3: Fours

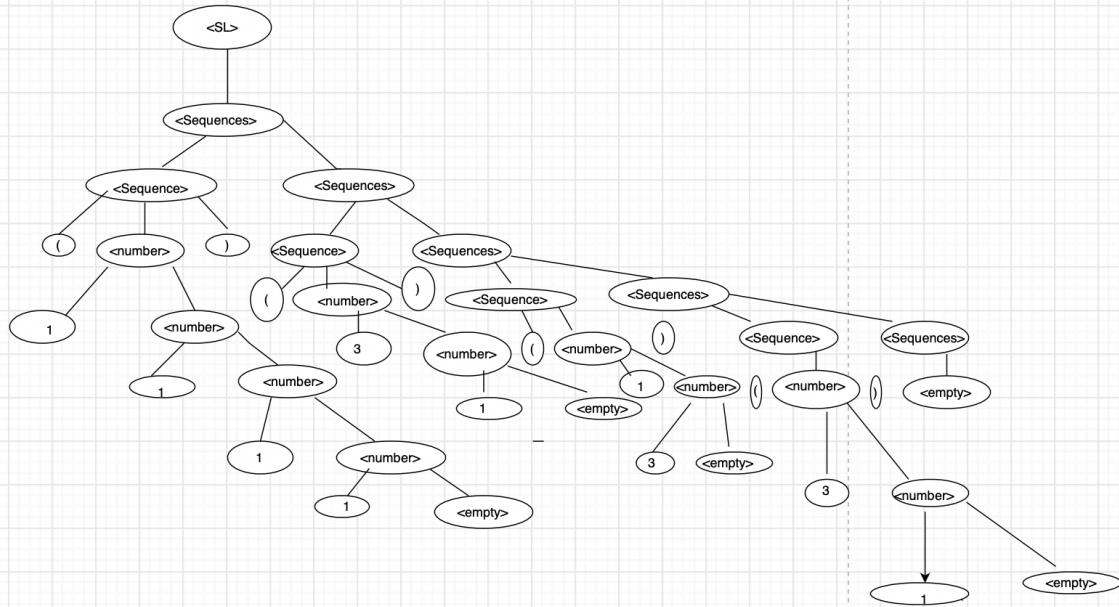
$\langle SL \rangle ::= \langle \text{empty} \rangle \mid \langle \text{sequences} \rangle$

$\langle \text{Sequences} \rangle ::= \langle \text{empty} \rangle \mid \langle \text{Sequence} \rangle \mid \langle \text{Sequences} \rangle$

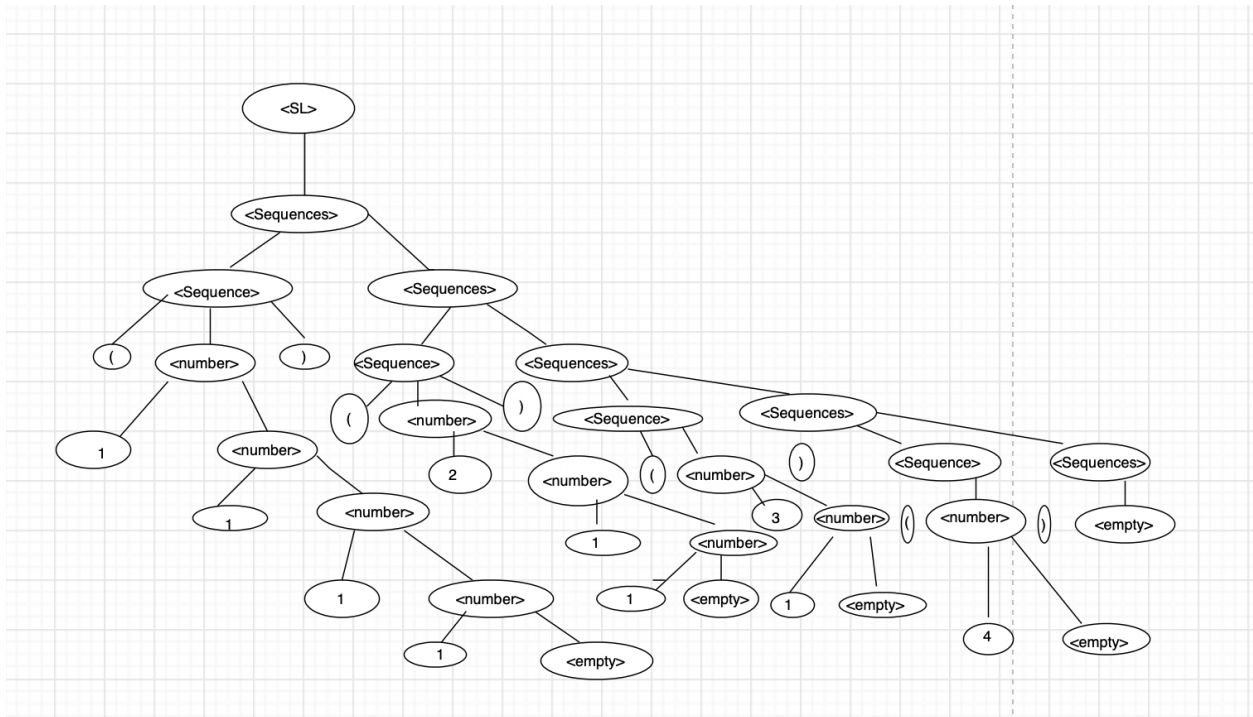
$\langle \text{Sequence} \rangle ::= (\langle \text{number} \rangle)$

$\langle \text{number} \rangle ::= \langle \text{empty} \rangle \mid \langle \text{number} \rangle 1 \mid \langle \text{number} \rangle 2 \mid \langle \text{number} \rangle 3 \mid \langle \text{number} \rangle 4$

(1111)(31)(13)(31)



(1111)(211)(31)(4)



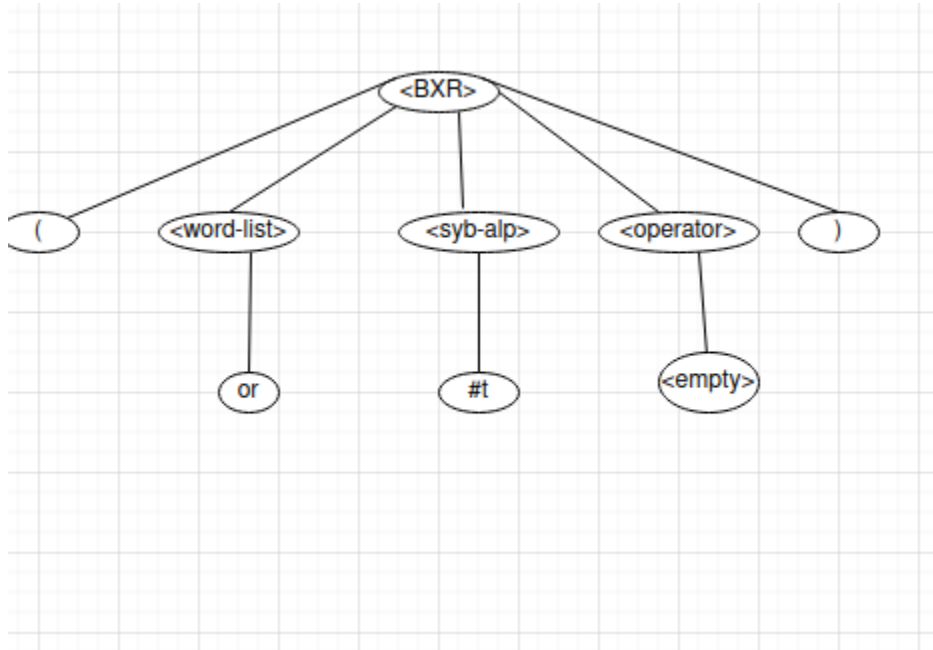
Problem 4 - BXR

$\langle \text{BXR} \rangle ::= (\langle \text{wordlist} \rangle \langle \text{syb-alp} \rangle \langle \text{operator} \rangle)$

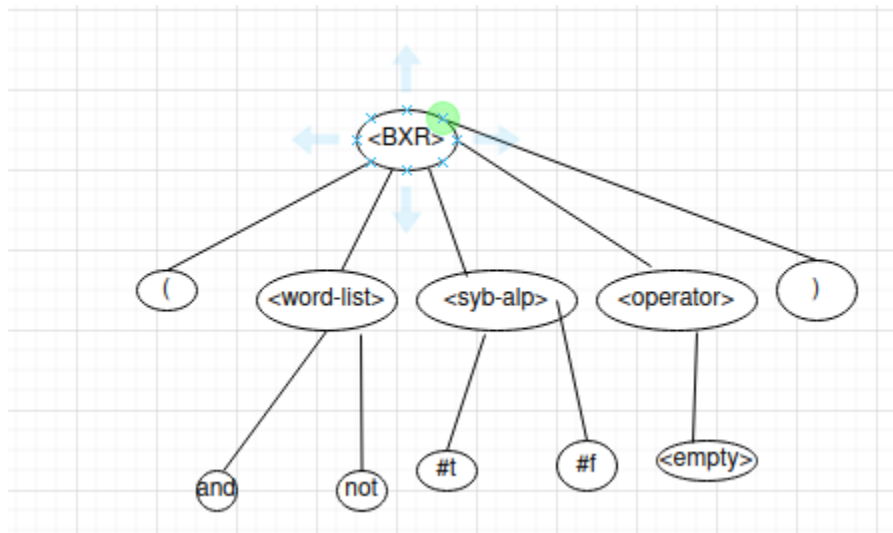
$\langle \text{syb-alp} \rangle ::= \#t \mid \#f \mid \text{empty}$

$\langle \text{word-list} \rangle ::= (\text{or} \mid \text{and} \mid \text{not})$

$\langle \text{operator} \rangle ::= \text{empty} \mid \#$



3. `(and (not #t) #f)`



Problem 5 - CF (Color Fun)

$\langle \text{CF} \rangle ::= (\langle \text{all-color} \rangle \langle \text{ae} \rangle \langle \text{word-form} \rangle)$

$\langle \text{all-color} \rangle ::= \langle \text{empty} \rangle \mid \text{purple}$

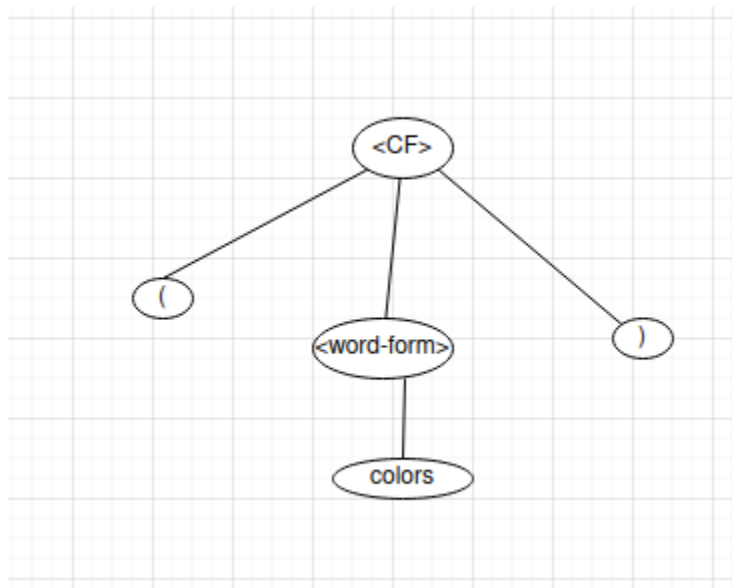
$\langle \text{ae} \rangle ::= \langle \text{number} \rangle \mid \langle \text{empty} \rangle$

$\langle \text{operator} \rangle ::= \langle \text{empty} \rangle \mid -$

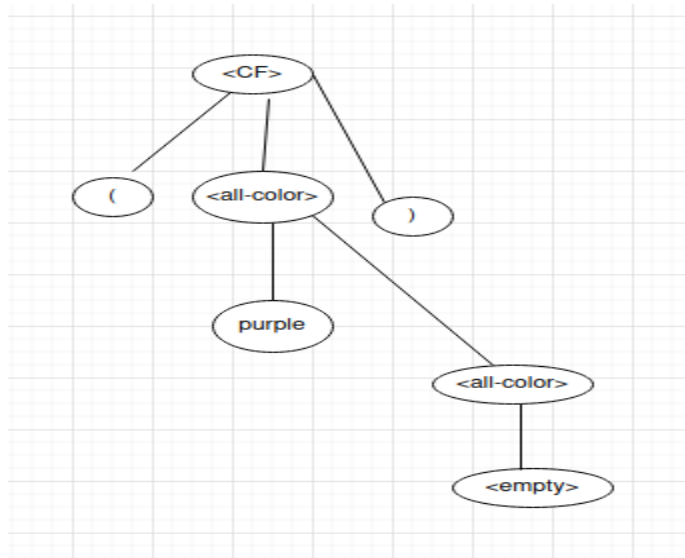
$\langle \text{word-form} \rangle ::= \text{favorite} \mid \text{color} \mid \text{colors}$

Note: this color fun part was very challenging, i was struck on how to coordinate the parenthesis and the word formation of favorite-color.

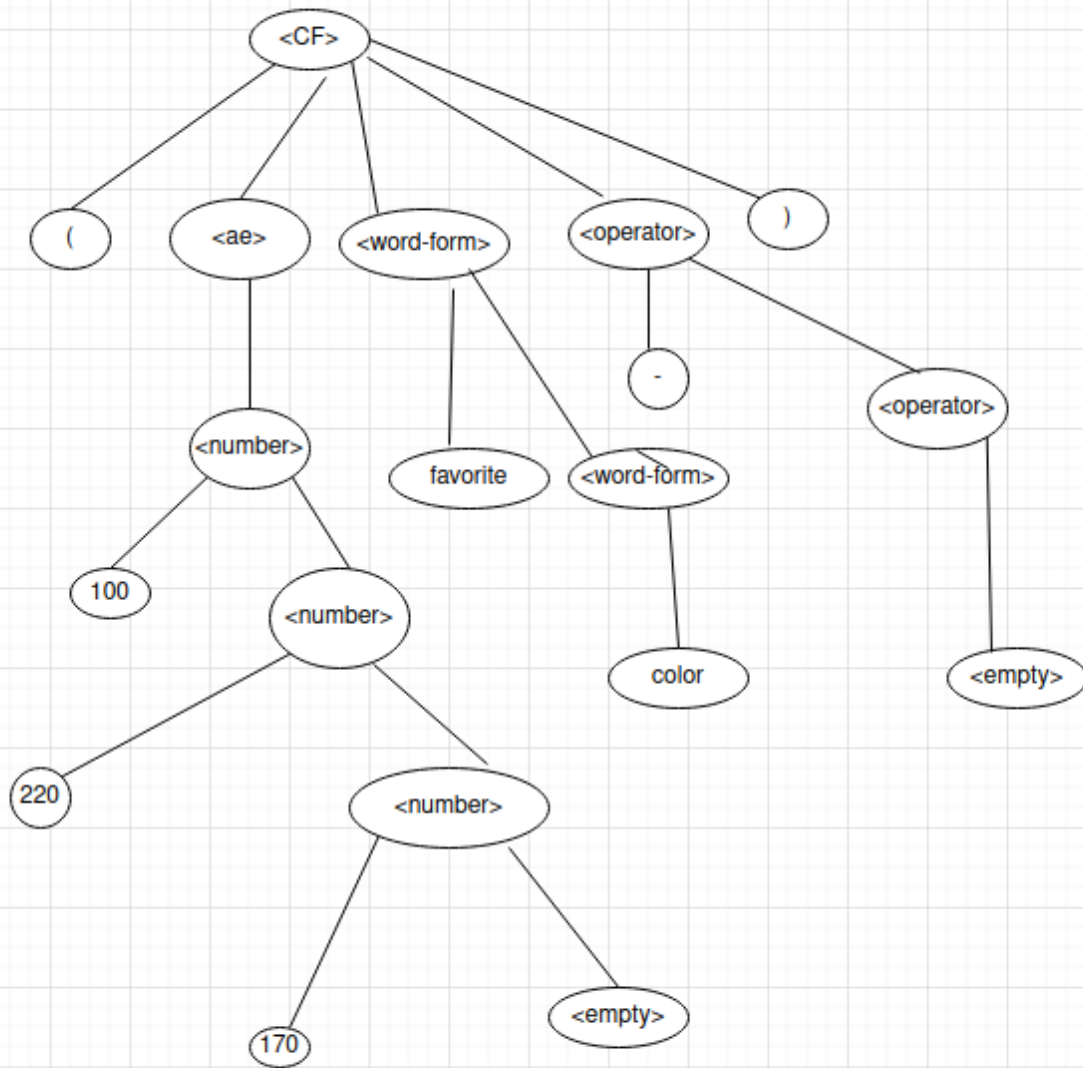
a)



b)



c)



Problem 6 - BNF

BNF stands for Backus-Normal form, a type of grammar which shows patterns that are extracted from a parent source. It mainly consists of 4 structures: (token, non-terminal, production and symbols). BNF is significant because it used to convert simple english words into programming languages structure to get a meaningful outcome.