BNF Assignment: First Interactions

Learning Abstract

This assignment is all about BNF. I will be asked to compose some BNF grammars for given languages. I will be asked to draw some BNF parse trees. I will be asked to describe BNF in English, in a straightforward, compelling manner.

Problem 1: Shapes

Problem 1:

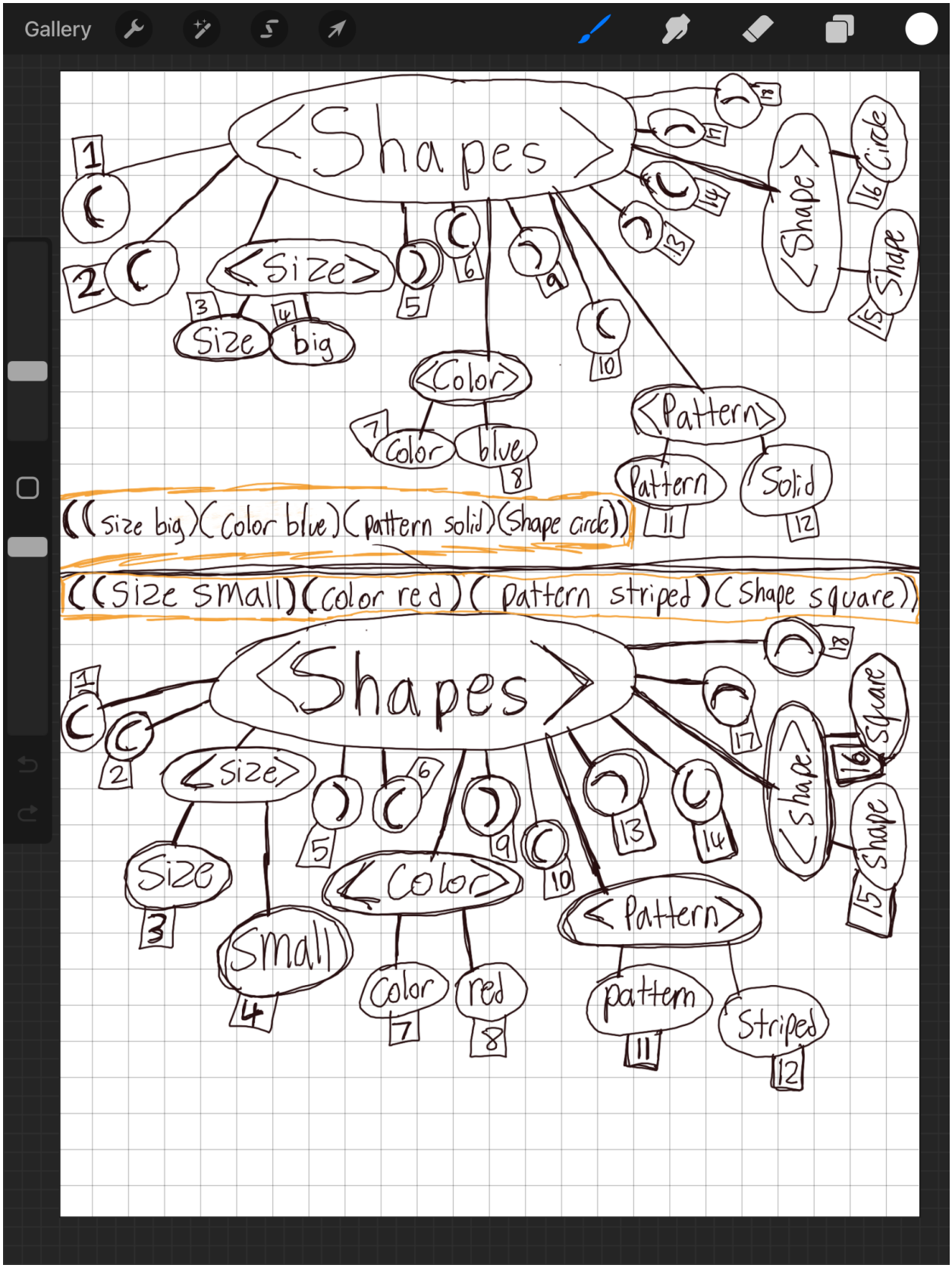
<Shapes>::= ((<size>)(<color>)(<pattern>)(<color>))

<size>::= size big | size medium | size small

<color>::= color red | color blue | color yellow

<pattern>::= pattern striped | pattern dotted | pattern solid

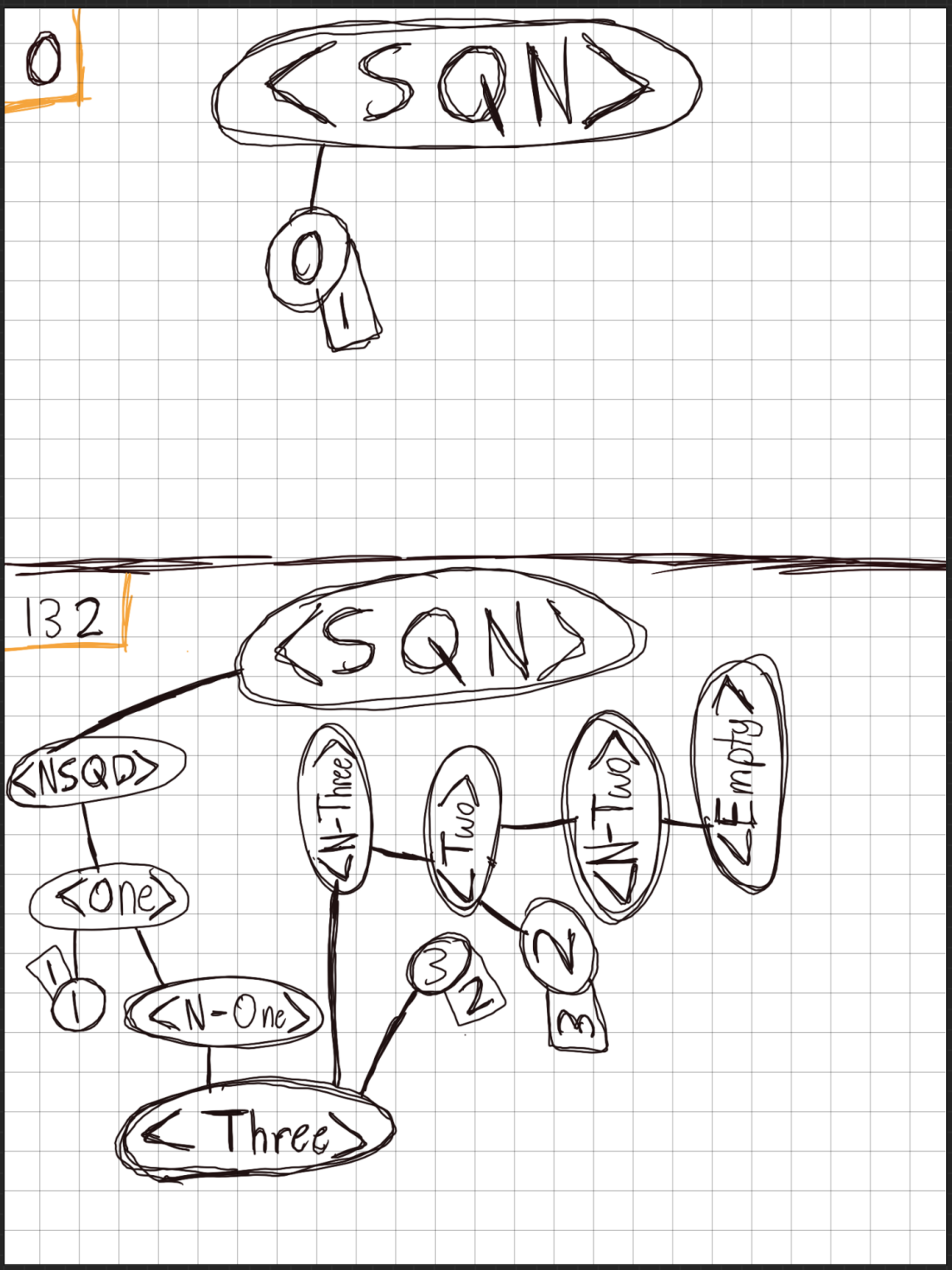
<shape>::= shape square | shape triangle | shape circle


Gallery
Shapes
1
2
<Size>
3
Size
4
big
5
6
9
10
<Color>
7
Color
blue
8
<Pattern>
Pattern
11
Solid
12
13
14
<Shape>
15
Shape
16
Circle
17
18
((size big)(color blue)(pattern solid)(Shape circle))
((Size small)(color red)(pattern striped)(Shape square))
Shapes
1
2
<Size>
3
Size
4
small
5
6
9
<Color>
7
Color
red
8
10
<Pattern>
pattern
11
Striped
12
13
14
<Shape>
15
Shape
16
Square
17
18

Problem 2: Shapes

Problem 2:
<SQN>::= <NSQD> | 0
<NSQD>::= <One>| <Two> | <Three>
<One>::= 1 <N-One>
<Two>::= 2 <N-Two>
<Three>::= 3 <N-Three>
<Zero>::= 0 <N-Zero>
<N-One::= <Two> | <Three> | <Zero> | <Empty>
<N-Two::= <One> | <Three> | <Zero> | <Empty>
<N-Three::= <Two> | <One> | <Zero> | <Empty>
<N-Zero::= <Two> | <Three> | <One> | <Empty>
<Empty>::=

You cannot draw a parse tree, consistent with the BNF grammar that I crafted, for the string: 1223 because that's not what was assigned to be included in the grammar. The assignment specifically asks that numbers don't consecutively repeat.


0
<SQN>
0
1
132
<SQN>
<NSQD>
<one>
1
1
<N-One>
<Three>
<N-Three>
<Two>
<N-Two>
<Empty>
3
2
2
m

Problem 3: Fours

Problem 3:

<Fours>::= <Four> | <TheRest>

<TheRest>::= <Twos> | <Threes> | <Ones> | <Four>

<Twos>::= <Two><Twos> | <Threes> | <Four> | <Empty>

<Two>::= (211) | (121) | (112)

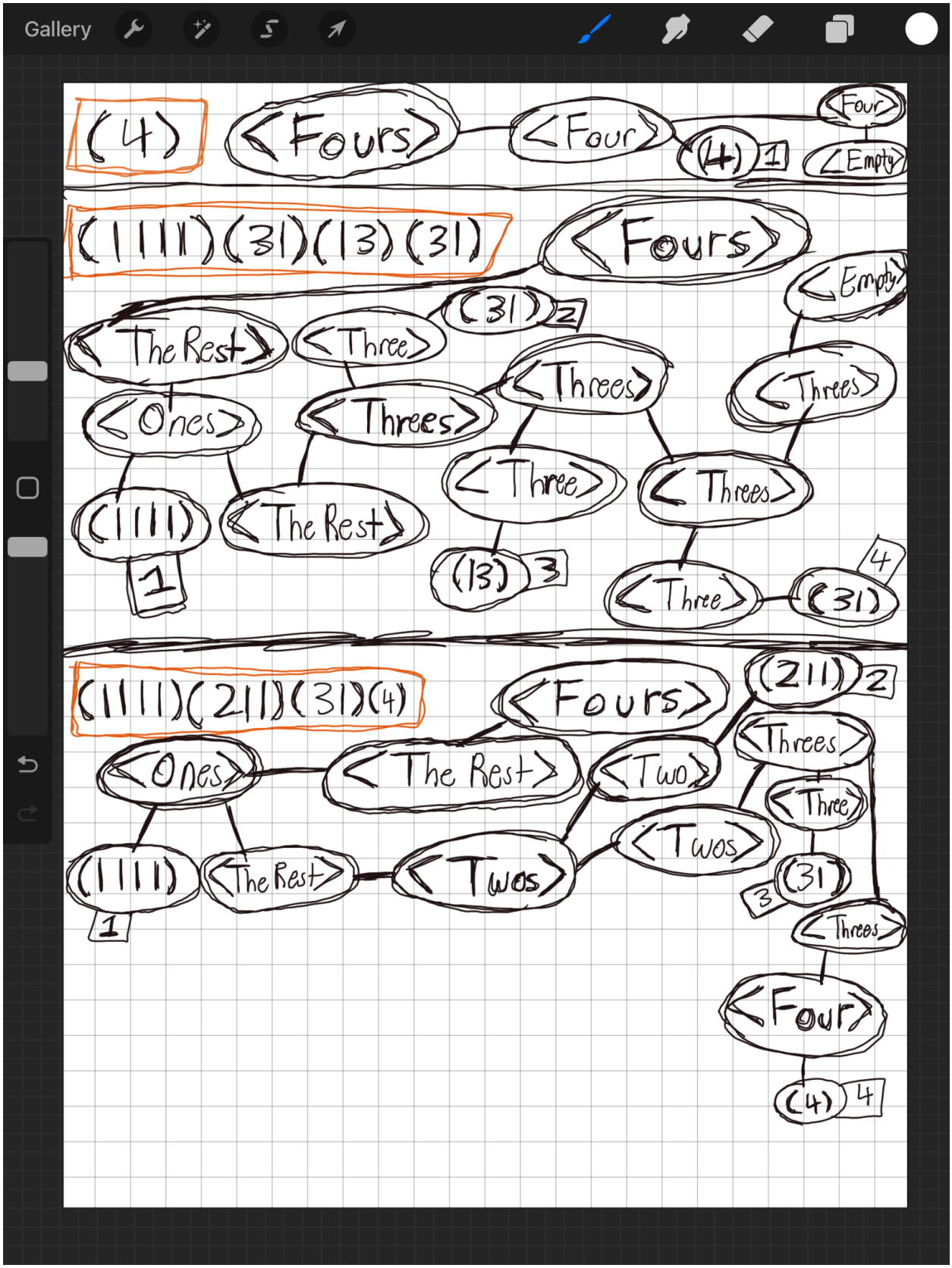
<Threes>::= <Three><Threes> | <Four> | <Empty>

<Three>::= (13) | (31)

<Four>::= (4) <Four> | <Empty>

<Ones>::= (1111)<TheRest> | <Empty>

<Empty>::=


(4)
<Fours>
<Four>
(4) 1
<Four>
<Empty>
(1111)(31)(13)(31)
<Fours>
<The Rest>
<Ones>
(1111)
1
<The Rest>
<Three>
(31) 2
<Threes>
<Three>
(13) 3
<Threes>
<Empty>
<Threes>
<Threes>
<Three>
(31) 4
(1111)(211)(31)(4)
<Fours>
<Ones>
(1111)
1
<The Rest>
<The Rest>
<Twos>
<Twos>
(211) 2
<Threes>
<Three>
(31) 3
<Threes>
<Four>
(4) 4

Problem 4: BXR

Problem 4:

<BXR>::= <Empty> | <Option>

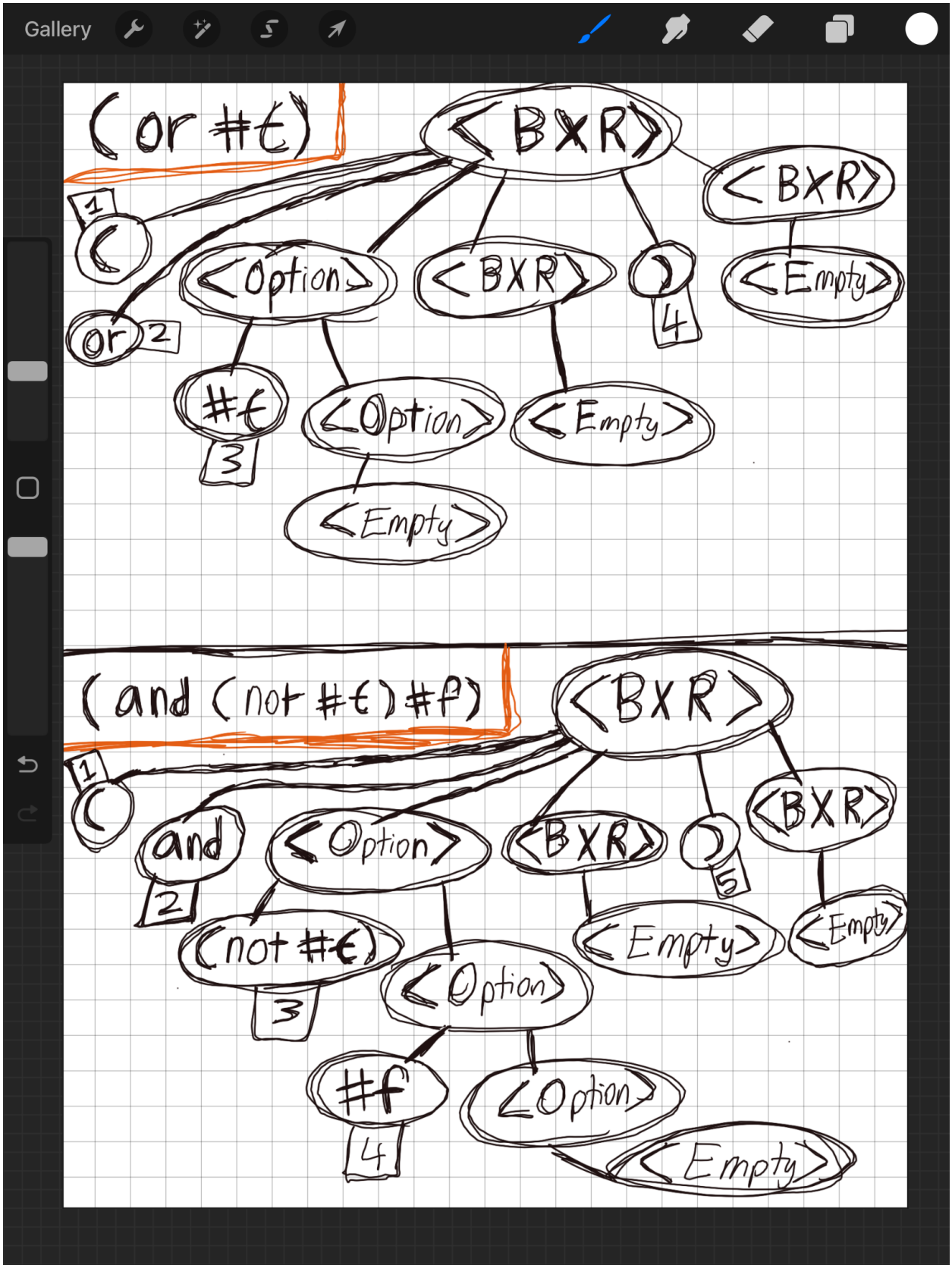
|(and <Option> <BXR>) <BXR>

| (or <Option><BXR>) <BXR>

<Option>::= #t <Option> | #f <Option> | (not #t) <Option>

| (not #f) <Option> | <Empty>

<Empty>::=

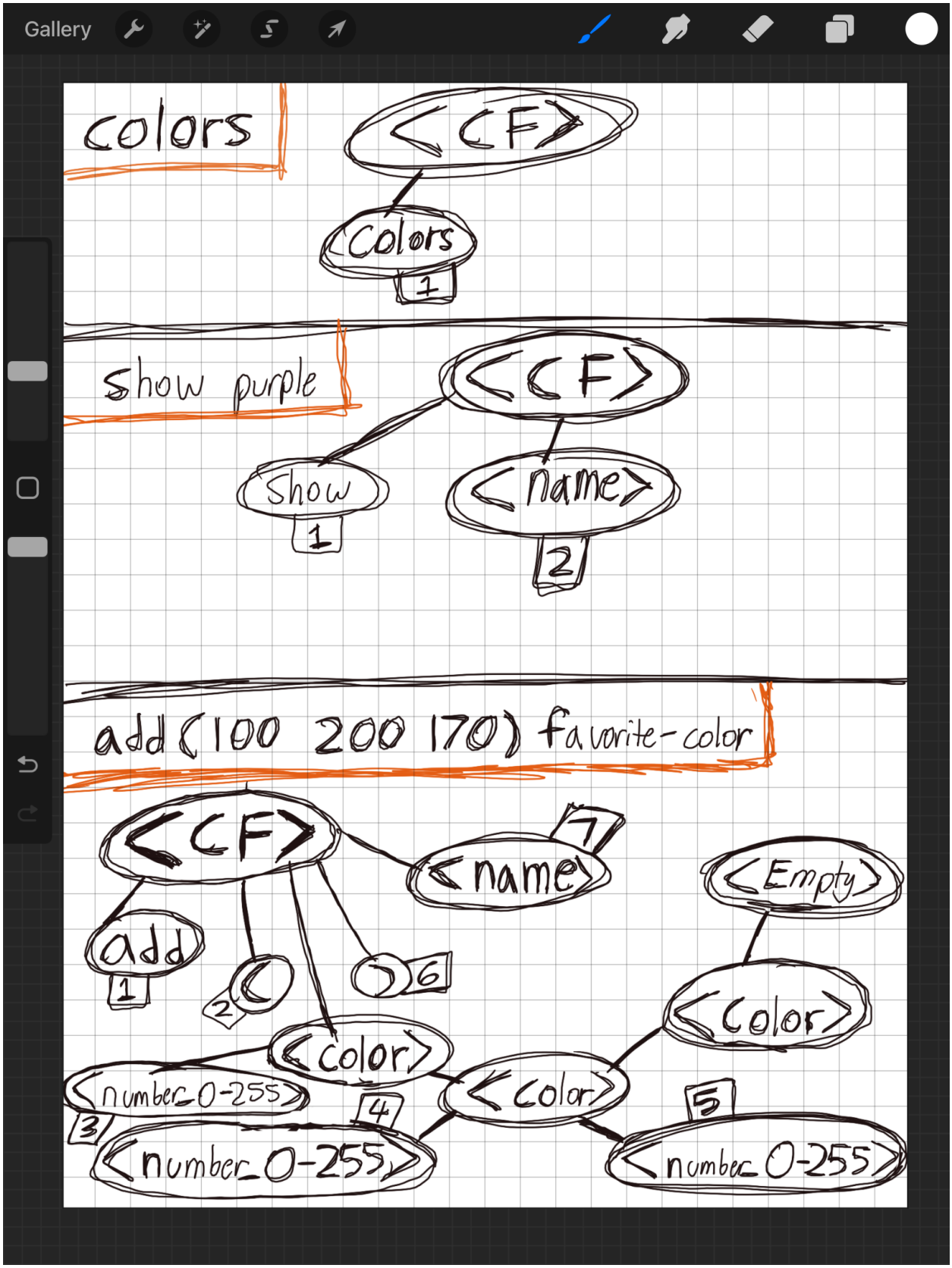

(or #t)
<BXR>
<BXR>
1
(
<Option>
<BXR>
)
<Empty>
or
2
4
#t
<Option>
<Empty>
3
<Empty>
(and (not #t) #f)
<BXR>
1
(
and
<Option>
<BXR>
)
<BXR>
2
5
(not #t)
<Empty>
<Empty>
3
<Option>
#f
<Option>
4
<Empty>

Problem 5: CF (Color Fun)

Problem 5:

<CF>::= (cf) | colors | add (<color>) <name>
| describe <name> | show <name> | colors | Exit

<color>::= <number_0-255><color>| <Empty> | color


Gallery
colors
<CF>
Colors
1
show purple
<CF>
Show
1
<name>
2
add (100 200 170) favorite-color
<CF>
add
1
2
<name>
7
<Empty>
6
<Color>
<color>
number 0-255
3
4
<color>
<color>
5
number 0-255
number 0-255

Problem 6: CF (Color Fun)

Problem 6:
BNF is a way to break down patterns in sentences or commands. You start from the command at the very top and just follow the instructions for the direction to go from there.