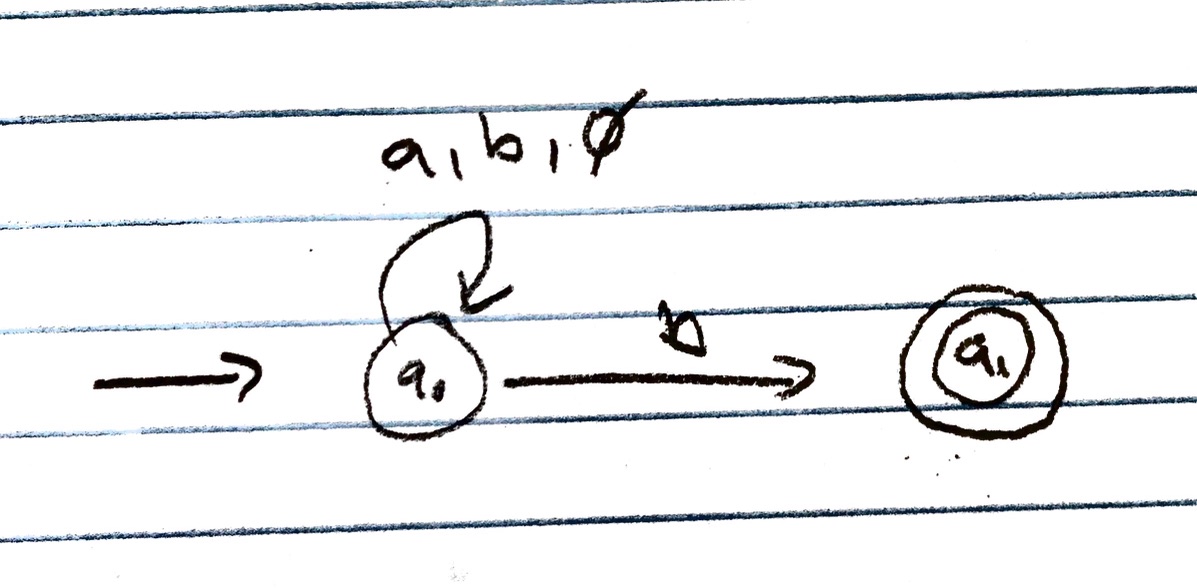
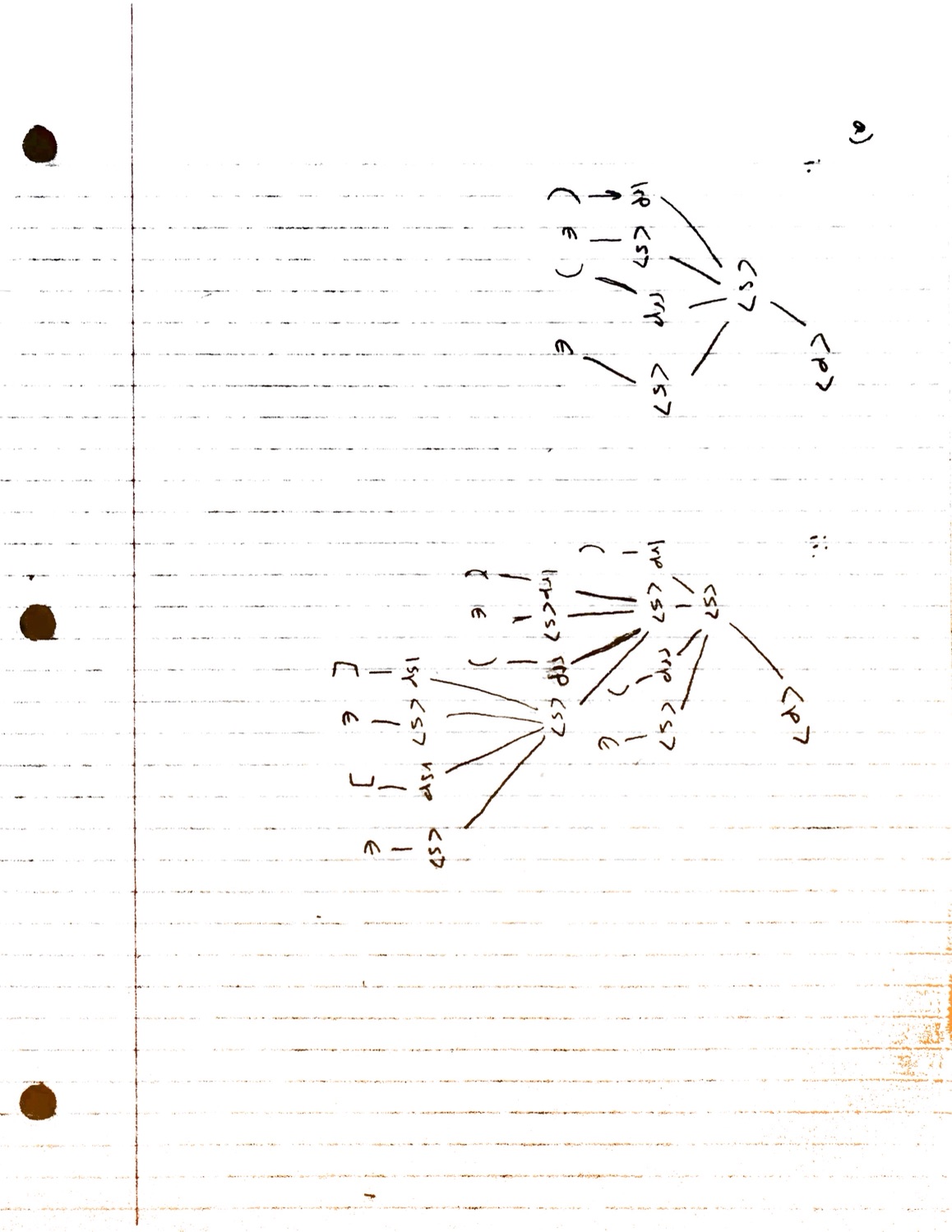
Homework 2: CFG

1. N.A.
2.  . (15) Show the NFA that results from applying the NFA construction method, discussed in the class, to the regular expression ( a | b | 0 )∧ b.
3. (40) Context Free Grammar.
   1. Write a context free grammar for arithmetic expressions which can use numbers, variables and operation + only
   2. Write a context free grammar for the arithmetic expressions above that captures right associativity.
   3. Write a context free grammar for arithmetic expressions which can use numbers, variables and binary operations - and + only. Your grammar has to capture the precedence that - must be computed before +. Your grammar should also capture the left associativity of + and -. For example 5+5−5−5+6−5 should be computed as 5 + (5 − 5 − 5) + (6 − 5).
   4. Refine your grammar above to allow parenthesis ( and ). Hint. Recall the techniques on how precedence and associativity were dealt with in the class.
4. (15) Given a grammar < P >→< S > < S >→ lrp < S > rrp < S > | lsp < S > rsp < S > | The terminals are defined as follows lrp → ( rrp → ) lsp → [ rsp → ] CS3361 Concepts of Programming Languages by Y Zhang, TTU, Spring 2021
   1. Draw a parse tree for each of the sentences:
   2. Write a rightmost derivation for [].
5. Consider the CFG for in the slides (of L6) for parsing (Page 16), and an input program sum := A + B

