CSE 340 Summer C 2025
HOMEWORK 1

All submissions must be PDF and should be typed. **Exceptions can only be made for drawing parse trees, which can be handwritten and scanned in the submitted document.**

Problem 1 (20 points). Consider the following regular expressions (we omit the dot operator)

R_0 = 1|2|3|4|5|6|7|8|9
R_1 =
0|1|2|3|4|5|6|7|8|9 R_2
= (0|1)* R_0 (0|1)
R_3 = 00 R_0*(0|1)*
R_4 = R_3* R_2* 000

Assume that the longest prefix-matching rule is used. Assume that ties are broken in favor of the regular expression listed first in the list.

1. Give an example of input for which getToken() returns R_0
2. Give an example of input for which getToken() returns R_1
3. Give an example of input for which getToken() returns R_2
4. Give an example of input for which getToken() returns R_3
5. Give an example of input for which getToken() returns R_4
6. If getToken() if called repeatedly on the following input, what is the sequence of tokens returned?

9900110167810001010103012 3457000010

Explain your answers by showing the step-by-step table.
Problem 2 (10 points). Consider the grammar

S → AB
A → aB | ε
B → bB | abA | A

1. Show that this grammar is ambiguous by constructing two different leftmost derivations for the string "abba".

2. Show that this grammar is ambiguous by constructing two different parse tresses for the string "abba".

Problem 3 (20 points). Compute FIRST and FOLLOW sets for the following grammar.

S → aABc | CD
A → DC | BE | ε
B → aCB | AF
C → cC | ε
D → CDb | ε
E → eFc
F → Fg | ε

Show your work. An answer by itself does not count.