key solution

Midterm-2 (Summer term 2020-2021)
CSC 340
KSU

Student Name:
Section:

Student Number:
Seat Number:

Q1) Consider the following CFG

S → XYZ| ε
X → Sa| ε
Y → YbZ| ε
Z → Zc| ε

A) Without constructing the LL(1), table can you tell if the grammar is LL(1) or not? Explain your answer. (2 grades)

It is not LL(1) because of the left recursion

B) Find the first and follow set for each symbol in the following table (6 grades)

Symbol	First Set	Follow Set
S	{a, b, c, ε}	{$, a}
X	{a, b, c, ε}	{b, c, $, a}
Y	{b, ε}	{b, c, $, a}
Z	{ε, c}	{b, c, $, a}
A	{a}	{b, c, $, a}
B	{b}	{b, c, $, a}

C) Construct the LL(1) table for the grammar. (4 grades)

	a	b	c	$
S	XYZ/ε	XYZ	XYZ	XYZ/ε
X	Sa/ε	Sa/ε	Sa/ε	ε
Y	ε	Yb/ε	ε	ε
Z	ε	ε	Zc/ε	ε

d) Rewrite the following grammar to make it suitable for LL(1) parsing. (4 grades)

E → E + int | E + float| int | float

2 problem left recursion + it need left factoring

possible solving

1) if you remove left recursion then left factoring

E → int E' | float E'

E' → + int E' | + float E' | ε

Now left factor

E → int E' | float E'

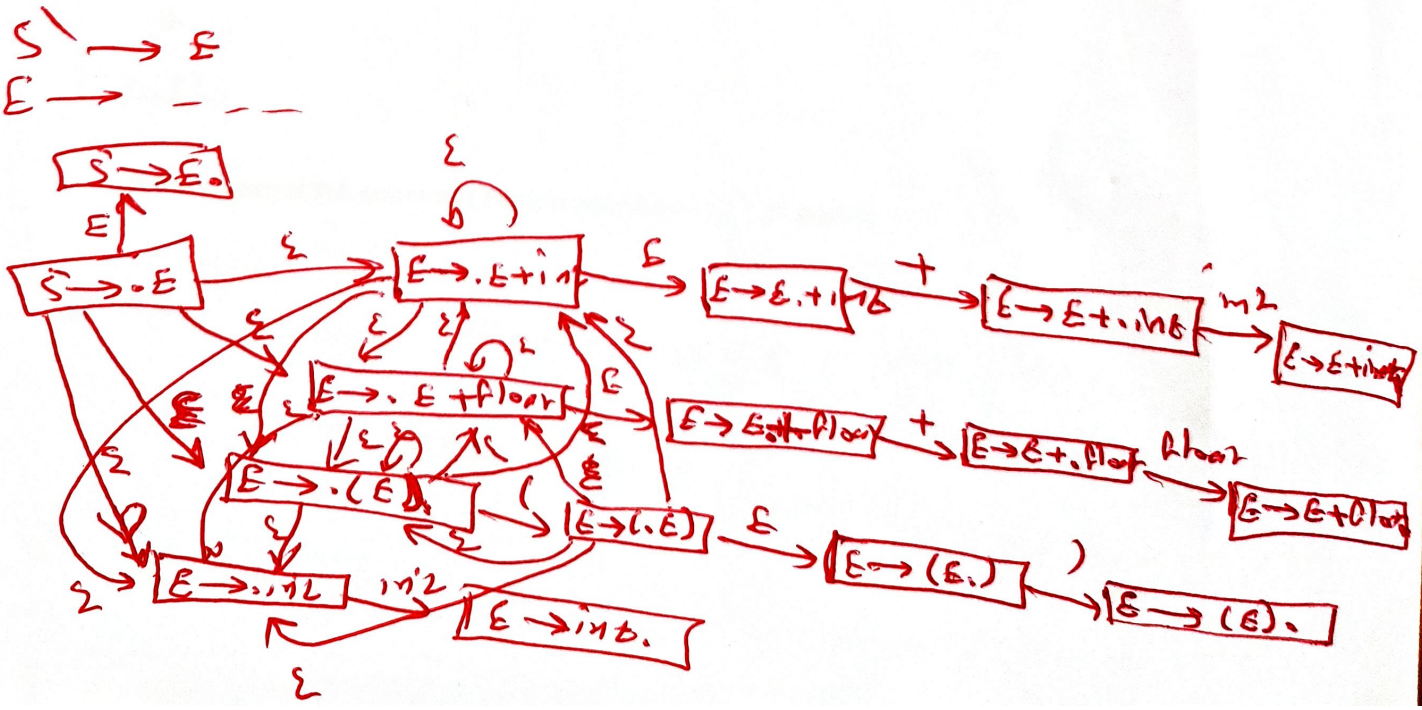
E' → + X

X → int E' | float E'

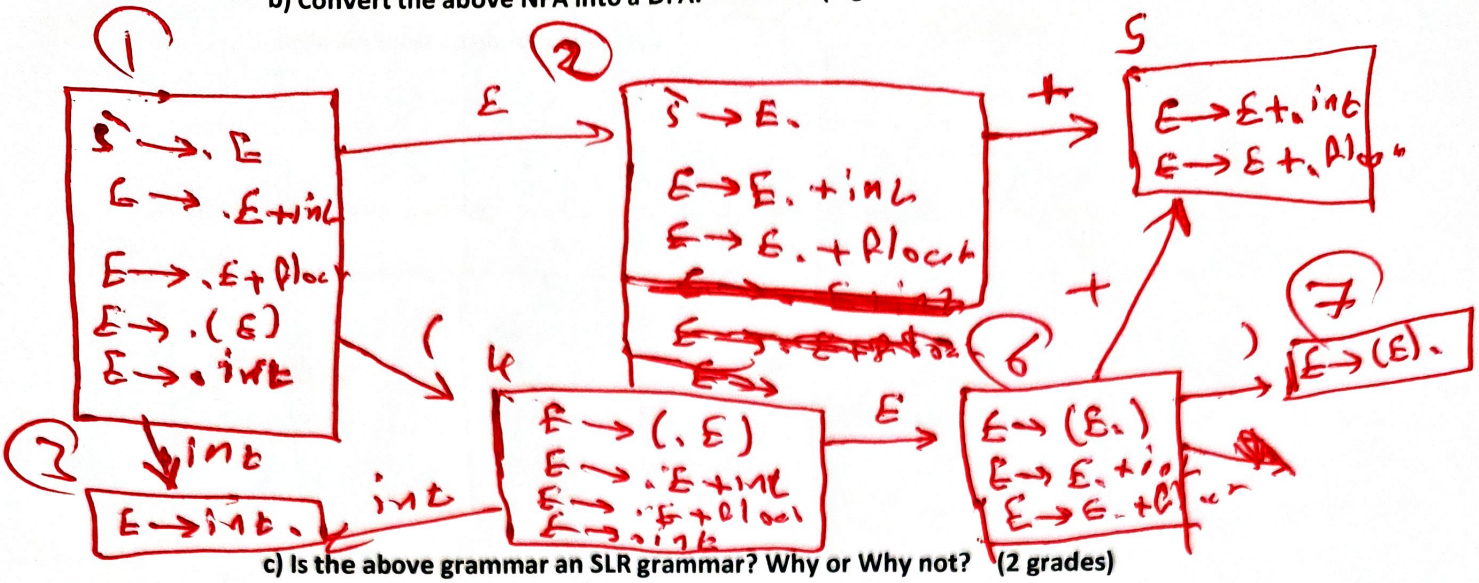
Q2) Consider the CFG

E → E + int | E + float| (E) | int

a) Write a NFA that recognizes the viable prefixes for the above grammar. (3 grades)



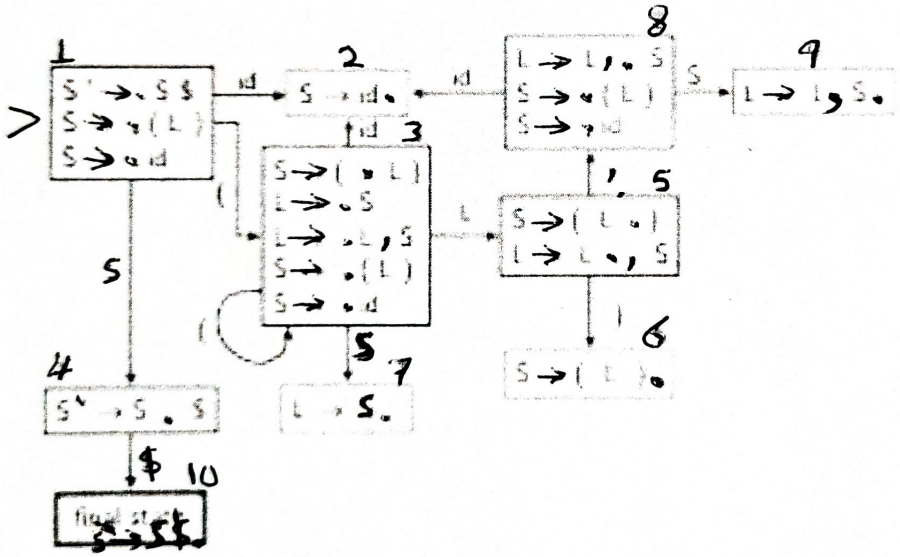
b) Convert the above NFA into a DFA. (3 grades)



c) Is the above grammar an SLR grammar? Why or Why not? (2 grades)

State 2 is the only state that has a shift-reduce conflict in state 2
but since + ∉ Follow(S') the heuristic resolves the conflict and thus the grammar is SLR

Q3) Consider the following LR(0) DFA.



a) Is the grammar SLR grammar? Explain your answer (2 grades)

Yes it is, since there are no conflicts in any state.

b) Use the DFA and the SLR parsing algorithm to parse the string "id , id id $". Please use a suitable table to show your steps. (4 grades)

Configuration	halt state	action
id , id id $	1	shift
id , id id $	2	reduce
S , id id $	4	Cannot shift the condition of shift is not met ',' ≠ '$' ⇒ Syntax error