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Assignment 3

March 6

1. $S' \rightarrow S$

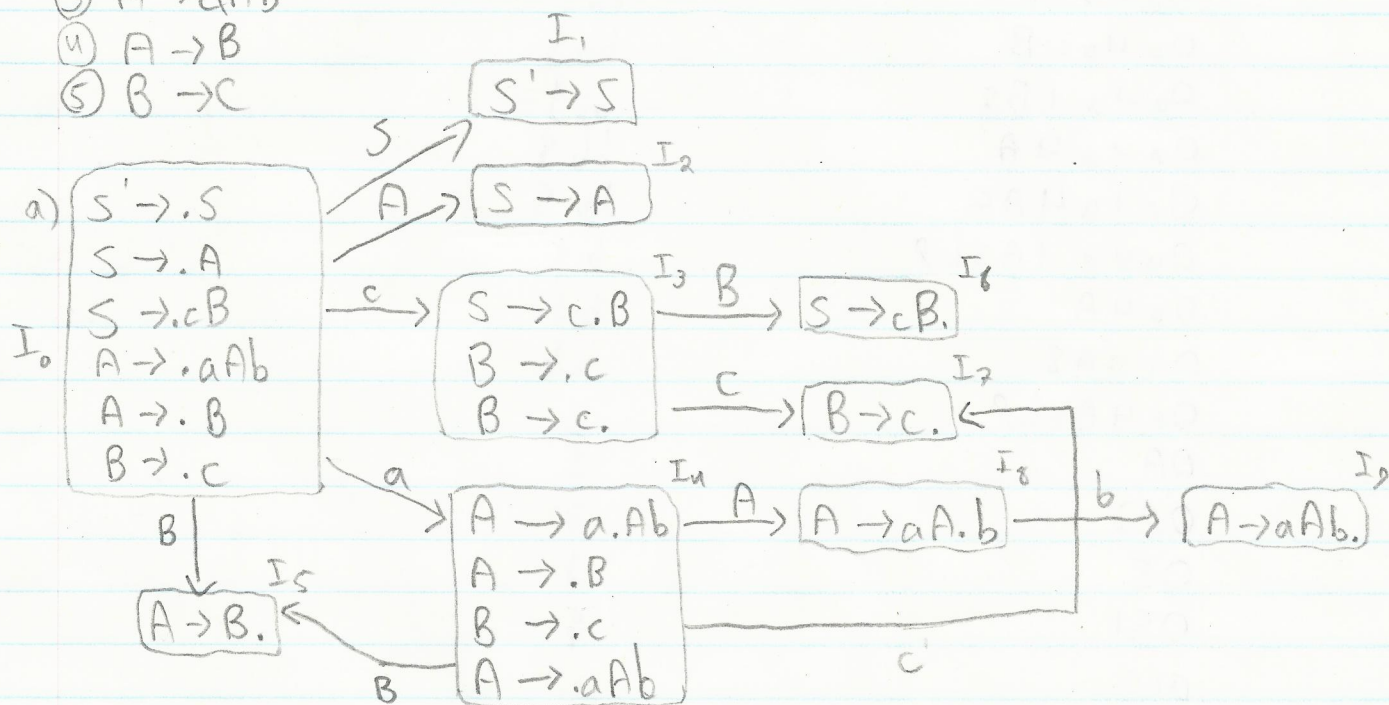
① $S \rightarrow A$

② $S \rightarrow cB$

③ $A \rightarrow aAb$

④ $A \rightarrow B$

⑤ $B \rightarrow c$



b) STATE

ACTION

GOTO

0

a
 S_4

b

c

#

A

B

S

1

S_4

S_3

acc

2

5

1

2

r_1

r_1

r_1

r_1

8

6

3

r_5

r_5

r_7

r_5

8

5

4

S_4

S_7

r_4

8

5

5

r_4

r_4

r_4

r_4

8

5

6

r_2

r_2

r_2

r_2

8

5

7

r_5

r_5

r_5

r_5

8

5

8

S_7

r_3

r_3

r_3

8

5

9

r_3

r_3

r_3

r_3

8

5

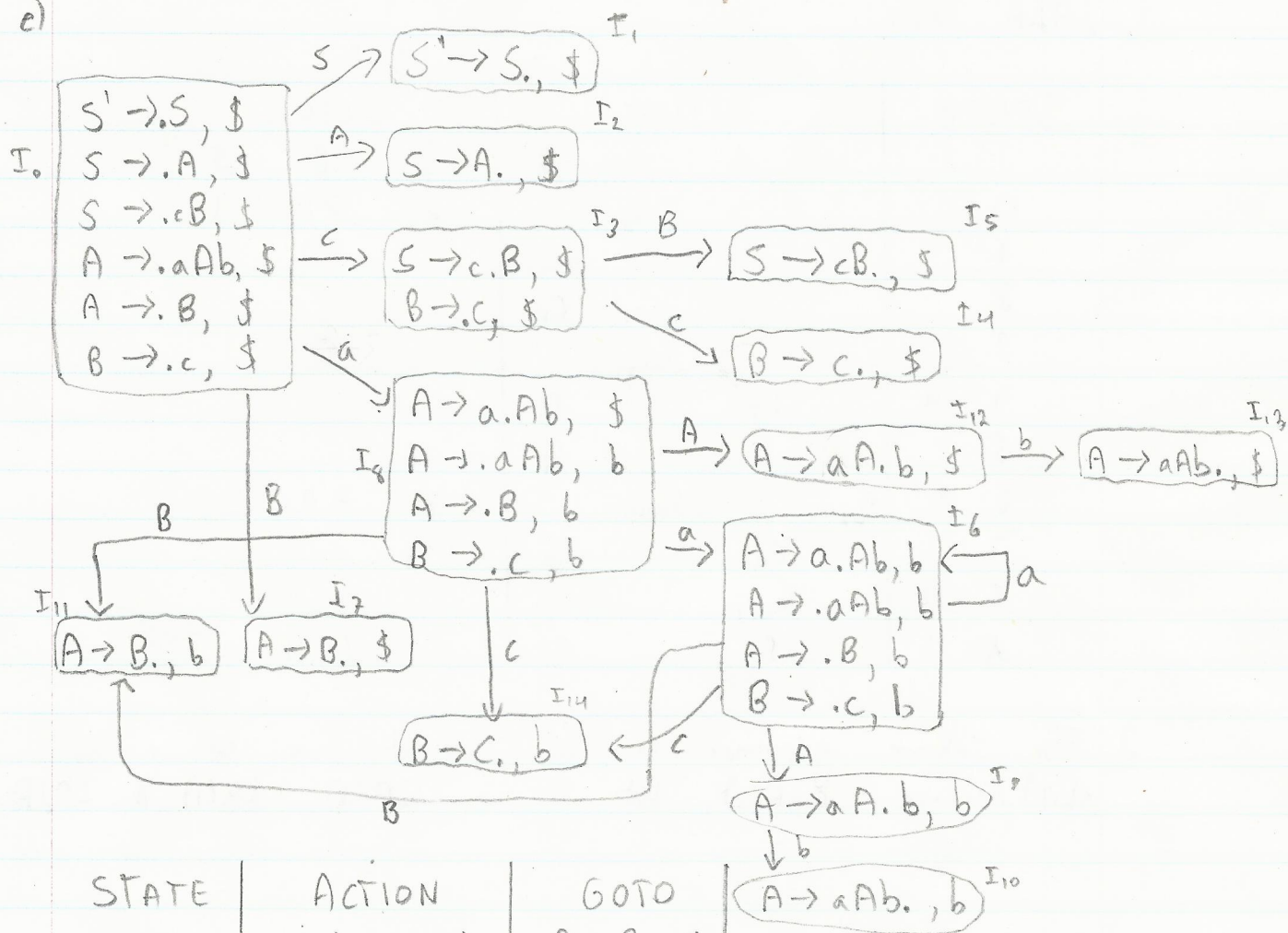
c) Parse trace for aacbb

| | |
|-----------|---------|
| 0 | aacbb\$ |
| 0a4 | acbb\$ |
| 0a4a4 | cbb\$ |
| 0a4a4c7 | bb\$ |
| 0a4a4B | bb\$ |
| 0a4a4B5 | bb\$ |
| 0a4a4A | bb\$ |
| 0a4a4A8 | bb\$ |
| 0a4a4A8b9 | b\$ |
| 0a4A | b\$ |
| 0a4A8 | b\$ |
| 0a4A8b9 | \$ |
| 0A | \$ |
| 0A2 | \$ |
| 0S | \$ |
| 0S1 | \$ |
| acc | |

d) SLR(1) Parsing Table

| STATE | ACTION | | | | GOTO | | | Follow | First |
|-------|----------------|----------------|----------------|----------------|------|---|---|----------|--------|
| | a | b | c | \$ | A | B | S | | |
| 0 | S ₄ | | S ₇ | | 2 | 5 | 1 | S' {s} | {c, a} |
| 1 | | | | acc | | | | A {s, b} | {c, a} |
| 2 | | | | r ₁ | | | | B {B, b} | {c} |
| 3 | | | S ₇ | | | 6 | | | |
| 4 | S ₄ | | S ₇ | | 8 | 5 | | | |
| 5 | | r ₄ | | r ₄ | | | | | |
| 6 | | | | r ₂ | | | | | |
| 7 | | r ₅ | | r ₅ | | | | | |
| 8 | | S ₇ | | | | | | | |
| 9 | | r ₃ | | r ₃ | | | | | |

e)



| STATE | ACTION | | | | GOTO | | |
|-------|-----------------|-----------------|----------------|----|------|----|---|
| | a | b | c | \$ | A | B | S |
| 0 | S ₄ | | S ₃ | | 2 | 7 | 1 |
| 1 | | | acc | | | | |
| 2 | | | r ₁ | | | | |
| 3 | | | S ₄ | | | 5 | |
| 4 | | | r ₅ | | | | |
| 5 | | | r ₂ | | | | |
| 6 | S ₆ | S ₁₁ | | | 9 | 11 | |
| 7 | | | r ₄ | | | | |
| 8 | S ₆ | S ₁₁ | | | 12 | | |
| 9 | S ₁₀ | | | | | | |
| 10 | r ₃ | | | | | | |
| 11 | r ₄ | | | | | | |
| 12 | S ₁₃ | | | | | | |
| 13 | | | r ₃ | | | | |
| 14 | r ₅ | | | | | | |

I₁₁
 I₁₄
 I₁₃
 I₉
 I₈

I₇
 I₄
 I₁₀
 I₁₂
 I₆

LALR Table

| STATE | ACTION | | | | GOTO | | |
|-------|----------|------------|-----------|-------|------|------|---|
| | a | b | c | \$ | A | B | S |
| 0 | S_{68} | | S_3 | | 2 | 7 11 | 1 |
| 1 | | | | acc | | | |
| 2 | | | | r_1 | | | |
| 3 | | | S_{114} | | | 5 | |
| 4 14 | | r_5 | | r_5 | | | |
| 5 | | | | r_2 | | | |
| 6 8 | S_{68} | | S_{114} | | 9 12 | 7 11 | |
| 7 11 | | r_4 | | r_4 | | | |
| 8 12 | | S_{1013} | | | | | |
| 9 13 | | r_3 | | r_3 | | | |

2. The above grammar is not LR(0), due to a shift/reduce conflict, but it is SLR(1), CLR(1) & LALR.