

Problem Set 3

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1.1

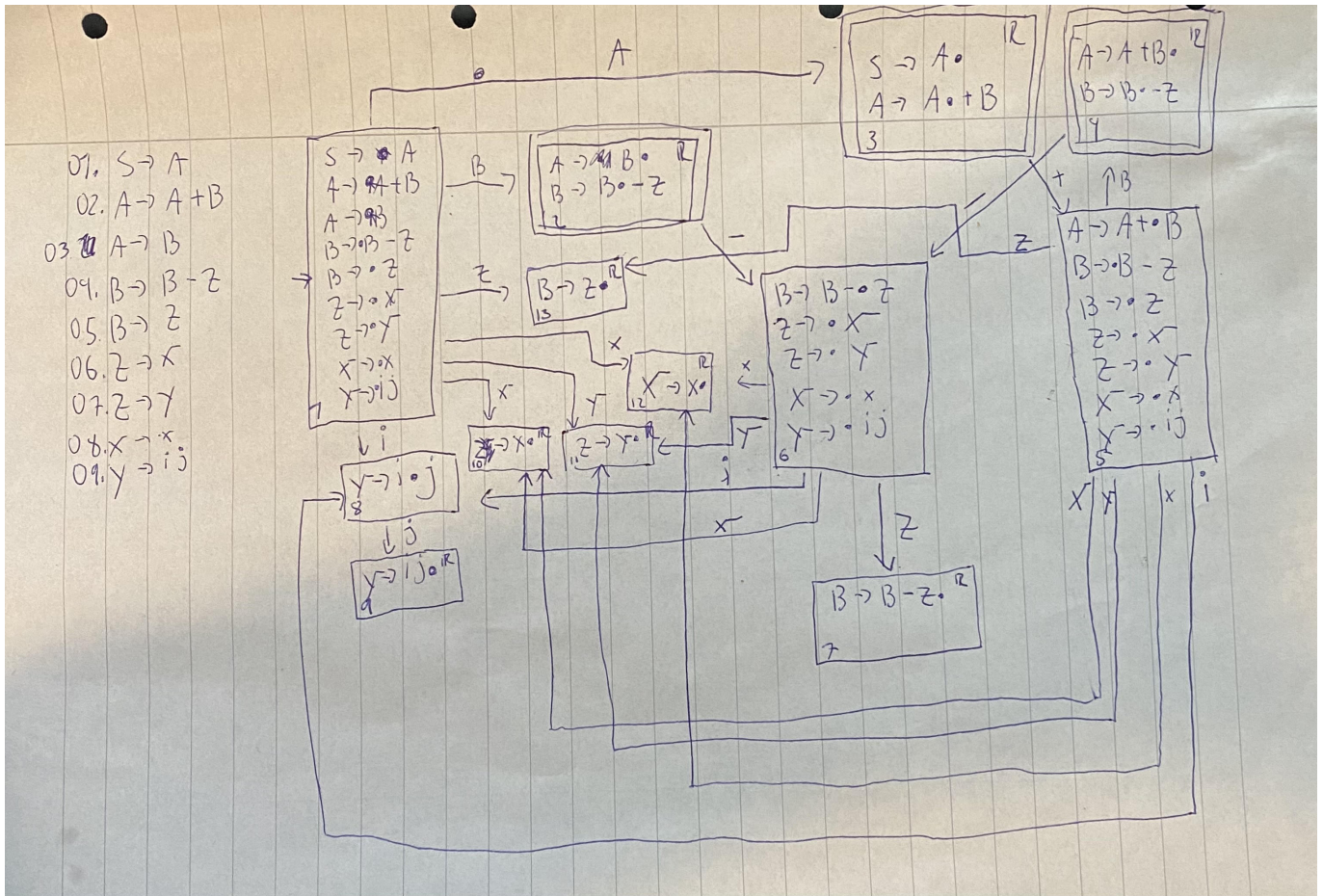
Given grammar:

```
A → A + B | B
B → B - Z | Z
Z → X | Y
X → x
Y → i j
```

Augmented grammar:

```
S → A          # rewritten axiom
A → A + B
A → B
B → B - Z
B → Z
Z → X
Z → Y
X → x
Y → i j
```

An R at the right-hand corner of a state signifies that a reduce action can be applied



1.2

The states with a double-outline have shift/reduce conflicts as both actions are possible.

1.3

Production rules with labels:

- 01 $S \rightarrow A$
- 02 $A \rightarrow A + B$
- 03 $A \rightarrow B$
- 04 $B \rightarrow B - Z$
- 05 $B \rightarrow Z$
- 06 $Z \rightarrow X$
- 07 $Z \rightarrow Y$
- 08 $X \rightarrow x$
- 09 $Y \rightarrow i j$

I have used these labels to denote where the reduce actions go to. (I realize this method is not perfect, but I don't have the time to redo it properly).

LR(0) table:

	x	i	j	-	+	\$	A	B	Z	X	Y
1	s12	s8					g3	g2	g13	g10	g11

	x	i	j	-	+	\$	A	B	Z	X	Y
2	r03	r03	r03	s6 / r03	r03	r03					
3	s5 / a					a					
4	r02	r02	r02	s6 / r02	r02	r02					
5	s12	s8							g13	g10	g11
6	s12	s8							g7	g10	g11
7	r04	r04	r04	r04	r04	r04					
8			s9								
9	r09	r09	r09	r09	r09	r09					
10	r06	r06	r06	r06	r06	r06					
11	r07	r07	r07	r07	r07	r07					
12	r08	r08	r08	r08	r08	r08					
13	r05	r05	r05	r05	r05	r05					

Follow sets:

```
follow(S) = { }
follow(A) = { + }
follow(B) = { + - }
follow(Z) = { + - }
follow(X) = { + - }
follow(Y) = { + - }
```

Given the follow sets we can produce the SLR table:

	x	i	j	-	+	\$	A	B	Z	X	Y
1	s12	s8					g3	g2	g13	g10	g11
2				s6	r03	r03					
3	s5					a					
4				s6 / r02	r02	r02					
5	s12	s8							g13	g10	g11
6	s12	s8							g7	g10	g11
7				r04	r04	r04					
8			s9								
9				r09	r09	r09					

	x	i	j	-	+	\$	A	B	Z	X	Y
10					r06	r06					
11				r07	r07	r07					
12				r08	r08	r08					
13				r05	r05	r05					

Here we see see there is still a conflict. This means the grammar is not SLR parseable.

2

See [ps3_skeleton/src/tree.c](#).