Proseminar *Parsing*
Sommersemester 2018

Übungsblatt 2

Teillösungen:

Aufgabe 1: Gegeben Grammatik G mit den Produktionen

(1) S → A a A b
(2) S → B b B a
(3) A → ε
(4) B → ε

a) Welche Wörter werden von G generiert?

⇒ab und ba

d) LR(0)-Punktregel-Mengen und LR(0)-Tabelle:

```
[0,[r(B,[.]),r(S,[.,B,b,B,b]),r(A,[.]),r(S,[.,A,a,A,b]),r(S+,[.,S])]]
[1,[r(S,[B,.,b,B,b])]]
[2,[r(S,[A,.,a,A,b])]]
[3,[r(S+,[S,.])]]
[4,[r(B,[.]),r(S,[B,b,.,B,b])]]
[5,[r(S,[B,b,B,.,b])]]
[6,[r(S,[B,b,B,b,.])]]
[7,[r(A,[.]),r(S,[A,a,.,A,b])]]
[8,[r(S,[A,a,A,.,b])]]
[9,[r(S,[A,a,A,b,.])]]
[0,A,2]
[0,B,1]
[0,S,3]
[1,b,4]
[2,a,7]
[4,B,5]
[5,b,6]
[7,A,8]
[8,b,9]
[[0,a,[[r,3],[r,4]]],[0,b,[[r,3],[r,4]]],[0,$,[[r,3],[r,4]]],[0,A,[2]],[0,B,[1]],[0,S,[3]]]
[[1,a,[]],[1,b,[4]],[1,$,[]],[1,A,[]],[1,B,[]],[1,S,[]]]
[[2,a,[7]],[2,b,[]],[2,$,[]],[2,A,[]],[2,B,[]],[2,S,[]]]
[[3,a,[]],[3,b,[]],[3,$,[acc]],[3,A,[]],[3,B,[]],[3,S,[]]]
[[4,a,[[r,4]]],[4,b,[[r,4]]],[4,$,[[r,4]]],[4,A,[]],[4,B,[5]],[4,S,[]]]
[[5,a,[]],[5,b,[6]],[5,$,[]],[5,A,[]],[5,B,[]],[5,S,[]]]
[[6,a,[[r,2]]],[6,b,[[r,2]]],[6,$,[[r,2]]],[6,A,[]],[6,B,[]],[6,S,[]]]
[[7,a,[[r,3]]],[7,b,[[r,3]]],[7,$,[[r,3]]],[7,A,[8]],[7,B,[]],[7,S,[]]]
[[8,a,[]],[8,b,[9]],[8,$,[]],[8,A,[]],[8,B,[]],[8,S,[]]]
[[9,a,[[r,1]]],[9,b,[[r,1]]],[9,$,[[r,1]]],[9,A,[]],[9,B,[]],[9,S,[]]]
```

e) Ist die Grammatik eine SLR-Grammatik (Begründung)?
⇒Nein!
s_0-Zeile enthält für a und b jeweils 2 Reduktionen die mit SLR-Lookahead nicht weiter eingeschränkt werden können.

Aufgabe 2: Gegeben sei die Grammatik mit den Produktionen

(1) S → A S
(2) S → b
(3) A → S A
(4) A → a

LR(0)-Punktregel-Mengen und LR(0)-Tabelle:

```
[0,[r(A,[.,a]),r(S,[.,b]),r(A,[.,S,A]),r(S,[.,A,S]),r(S+,[.,S])]]
[1,[r(A,[a,.])]]
[2,[r(S,[b,.])]]
[3,[r(A,[.,a]),r(S,[.,b]),r(A,[.,S,A]),r(S,[.,A,S]),r(S,[A,.,S])]]
[4,[r(S,[.,b]),r(A,[.,a]),r(S,[.,A,S]),r(A,[.,S,A]),r(S+,[S,.]),r(A,[S,.,A])]]
[5,[r(S,[.,b]),r(A,[.,a]),r(S,[.,A,S]),r(A,[.,S,A]),r(S,[A,S,.]),r(A,[S,.,A])]]
[6,[r(S,[.,b]),r(A,[.,a]),r(S,[.,A,S]),r(A,[.,S,A]),r(A,[S,.,A])]]
[7,[r(A,[.,a]),r(S,[.,b]),r(A,[.,S,A]),r(S,[.,A,S]),r(A,[S,A,.]),r(S,[A,.,S])]]
[0,A,3]
[0,S,4]
[0,a,1]
[0,b,2]
[3,A,3]
[3,S,5]
[3,a,1]
[3,b,2]
[4,A,7]
[4,S,6]
[4,a,1]
[4,b,2]
[5,A,7]
[5,S,6]
[5,a,1]
[5,b,2]
[6,A,7]
[6,S,6]
[6,a,1]
[6,b,2]
[7,A,3]
[7,S,5]
[7,a,1]
[7,b,2]
[[0,a,[1]],[0,b,[2]],[0,$,[]],[0,A,[3]],[0,S,[4]]]
[[1,a,[[r,4]]],[1,b,[[r,4]]],[1,$,[[r,4]]],[1,A,[]],[1,S,[]]]
[[2,a,[[r,2]]],[2,b,[[r,2]]],[2,$,[[r,2]]],[2,A,[]],[2,S,[]]]
[[3,a,[1]],[3,b,[2]],[3,$,[]],[3,A,[3]],[3,S,[5]]]
[[4,a,[1]],[4,b,[2]],[4,$,[acc]],[4,A,[7]],[4,S,[6]]]
[[5,a,[1,[r,1]]],[5,b,[2,[r,1]]],[5,$,[[r,1]]],[5,A,[7]],[5,S,[6]]]
[[6,a,[1]],[6,b,[2]],[6,$,[]],[6,A,[7]],[6,S,[6]]]
[[7,a,[1,[r,3]]],[7,b,[2,[r,3]]],[7,$,[[r,3]]],[7,A,[3]],[7,S,[5]]]
```

Aufgabe 3: Gegeben sei die Grammatik mit den Produktionen

(1) S $\rightarrow$ NP VP
(2) VP $\rightarrow$ VP PP
(3) VP $\rightarrow$ v NP
(4) NP $\rightarrow$ d N1
(5) N1 $\rightarrow$ a N1
(6) N1 $\rightarrow$ n
(5) N1 $\rightarrow \epsilon$

LR(0)-Punktregel-Mengen und LR(0)-Tabelle:

```
0,[r(NP,[.,d,N1]),r(S,[.,NP,VP]),r(S+,[.,S])]
1,[r(N1,[.]),r(N1,[.,n]),r(N1,[.,a,N1]),r(NP,[d,.,N1])]
2,[r(VP,[.,v,NP]),r(VP,[.,VP,PP]),r(S,[NP,.,VP])]
3,[r(S+,[S,.])]
4,[r(N1,[n,.])]
5,[r(N1,[.]),r(N1,[.,n]),r(N1,[.,a,N1]),r(N1,[a,.,N1])]
6,[r(NP,[d,N1,.])]
7,[r(N1,[a,N1,.])]
8,[r(NP,[.,d,N1]),r(VP,[v,.,NP])]
9,[r(PP,[.,p,NP]),r(S,[NP,VP,.]),r(VP,[VP,.,PP])]
10,[r(VP,[v,NP,.])]
11,[r(NP,[.,d,N1]),r(PP,[p,.,NP])]
12,[r(VP,[VP,PP,.])]
13,[r(PP,[p,NP,.])]
0,NP,2]
0,S,3]
0,d,1]
1,N1,6]
1,a,5]
1,n,4]
2,VP,9]
2,v,8]
5,N1,7]
5,a,5]
5,n,4]
8,NP,10]
8,d,1]
9,PP,12]
9,p,11]
11,NP,13]
11,d,1]
[0,a,[],[0,d,[1]],[0,n,[]],[0,p,[]],[0,v,[]],[0,$,[]],[0,N1,[]],[0,NP,[2]],[0,PP,[]],[0,S,[3]],[0,VP,[]]]
[1,a,[5,[r,7]]],[1,d,[[r,7]]],[1,n,[4,[r,7]]],[1,p,[[r,7]]],[1,v,[[r,7]]],[1,$,[[r,7]]],[1,N1,[6]],[1,NP,[]],[1,PP,[]],[1,S,[]],[1,VP,[]]]
[2,a,[]],[2,d,[]],[2,n,[]],[2,p,[]],[2,v,[8]],[2,$,[]],[2,N1,[]],[2,NP,[]],[2,PP,[]],[2,S,[]],[2,VP,[9]]]
[3,a,[]],[3,d,[]],[3,n,[]],[3,p,[]],[3,v,[]],[3,$,[acc]],[3,N1,[]],[3,NP,[]],[3,PP,[]],[3,S,[]],[3,VP,[]]]
[4,a,[[r,6]]],[4,d,[[r,6]]],[4,n,[[r,6]]],[4,p,[[r,6]]],[4,v,[[r,6]]],[4,$,[[r,6]]],[4,N1,[]],[4,NP,[]],[4,PP,[]],[4,S,[]],[4,VP,[]]]
[5,a,[5,[r,7]]],[5,d,[[r,7]]],[5,n,[4,[r,7]]],[5,p,[[r,7]]],[5,v,[[r,7]]],[5,$,[[r,7]]],[5,N1,[7]],[5,NP,[]],[5,PP,[]],[5,S,[]],[5,VP,[]]]
[6,a,[[r,4]]],[6,d,[[r,4]]],[6,n,[[r,4]]],[6,p,[[r,4]]],[6,v,[[r,4]]],[6,$,[[r,4]]],[6,N1,[]],[6,NP,[]],[6,PP,[]],[6,S,[]],[6,VP,[]]]
[7,a,[[r,5]]],[7,d,[[r,5]]],[7,n,[[r,5]]],[7,p,[[r,5]]],[7,v,[[r,5]]],[7,$,[[r,5]]],[7,N1,[]],[7,NP,[]],[7,PP,[]],[7,S,[]],[7,VP,[]]]
[8,a,[]],[8,d,[1]],[8,n,[]],[8,p,[]],[8,v,[]],[8,$,[]],[8,N1,[]],[8,NP,[10]],[8,PP,[]],[8,S,[]],[8,VP,[]]]
[9,a,[[r,1]]],[9,d,[[r,1]]],[9,n,[[r,1]]],[9,p,[11,[r,1]]],[9,v,[[r,1]]],[9,$,[[r,1]]],[9,N1,[]],[9,NP,[]],[9,PP,[12]],[9,S,[]],[9,VP,[]]]
[10,a,[[r,3]]],[10,d,[[r,3]]],[10,n,[[r,3]]],[10,p,[[r,3]]],[10,v,[[r,3]]],[10,$,[[r,3]]],[10,N1,[]],[10,NP,[]],[10,PP,[]],[10,S,[]],[10,VP
[]]]
[11,a,[]],[11,d,[1]],[11,n,[]],[11,p,[]],[11,v,[]],[11,$,[]],[11,N1,[]],[11,NP,[13]],[11,PP,[]],[11,S,[]],[11,VP,[]]]
[12,a,[[r,2]]],[12,d,[[r,2]]],[12,n,[[r,2]]],[12,p,[[r,2]]],[12,v,[[r,2]]],[12,$,[[r,2]]],[12,N1,[]],[12,NP,[]],[12,PP,[]],[12,S,[]],[12,VP
[]]]
[13,a,[[r,8]]],[13,d,[[r,8]]],[13,n,[[r,8]]],[13,p,[[r,8]]],[13,v,[[r,8]]],[13,$,[[r,8]]],[13,N1,[]],[13,NP,[]],[13,PP,[]],[13,S,[]],[13,VP
[]]]
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