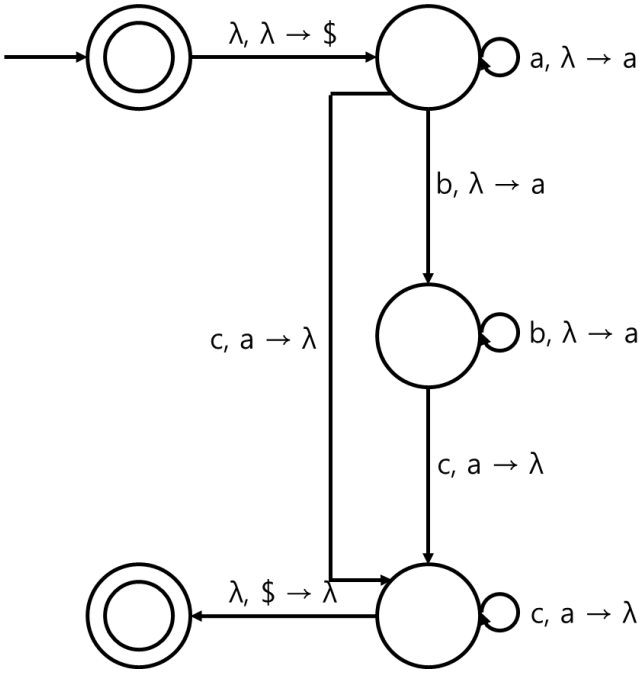
Assignment 5

1. Do Exercise 9(d) of Section 5.1 at page 147.
   - $P : S \to aSbb|aSbbb|\lambda$
2. Do Exercise 9 of Section 5.2 at page 159.
   - $S \to AB$
   - $A \to a|Aa$
   - $B \to b$
   - Since $aaaB$ can created by $S \Rightarrow AB \Rightarrow AaB \Rightarrow AaaB \Rightarrow aaaB$, we can simply remove it to make grammar unambiguous.
3. Do Exercise 5 of Section 6.2 at page 188.
   - $S \to AB|T_bB_1|T_bT_b|T_aB$
   - $A \to T_aA_1$
   - $A_1 \to T_bT_b$
   - $B \to T_bB_1|T_bT_b$
   - $B_1 \to T_bA$
   - $T_a \to a$
   - $T_b \to b$
4. Do Exercise 1 of Section 6.3 at page 191.
   - abb
     - $V_{11} = \{A\}, V_{22} = \{B\}, V_{33} = \{B\}$
     - $V_{12} = \{S, B\}, V_{23} = \{A\}$
     - $V_{13} = \{A\}$
     - Since $S \notin V_{13}$, abb can't be generated by grammar.
   - bbb
     - $V_{11} = \{B\}, V_{22} = \{B\}, V_{33} = \{B\}$

- $V_{12} = \{A\}, V_{23} = \{A\}$
- $V_{13} = \{S, B\}$
- Since $S \in V_{13}$, bbb can be generated by grammar.

- $aabba$
  - $V_{11} = \{A\}, V_{22} = \{A\}, V_{33} = \{B\}, V_{44} = \{B\}, V_{55} = \{A\}$
  - $V_{12} = \varnothing, V_{23} = \{S, B\}, V_{34} = \{A\}, V_{45} = \varnothing$
  - $V_{13} = \{S, B\}, V_{24} = \{A\}, V_{35} = \varnothing$
  - $V_{14} = \{A\}, V_{25} = \varnothing$
  - $V_{15} = \varnothing$
  - Since $S \notin V_{15}$, $aabba$ can't be generated by grammar.
- $abbbb$
  - $V_{11} = \{A\}, V_{22} = \{B\}, V_{33} = \{B\}, V_{44} = \{B\}, V_{55} = \{B\}$
  - $V_{12} = \{S, B\}, V_{23} = \{A\}, V_{34} = \{A\}, V_{45} = \{A\}$
  - $V_{13} = \{A\}, V_{24} = \{S, B\}, V_{35} = \{S, B\}$
  - $V_{14} = \{S, B\}, V_{25} = \{A\}$
  - $V_{15} = \{A\}$
  - Since $S \notin V_{15}$, $abbbb$ can't be generated by grammar.

5. Do Exercise 6(c) of Section 7.1 at page 202.



6. Do Exercise 1(b) of Section 7.4 at page 225.

- $S \to aaaAcc$
- $A \to aAc|B$
- $B \to bBc|b$
- Start is always $S \to aaaAcc$, and if a appears, apply $A \to aAc$, and if b appears, apply $A \to B$ or $B \to bBc$, and if c appears, apply $B \to b$.