1. {0,{1},{2}} 和 {重,ε,{理}} 的幂集.

设 $A=\{0,\{1\},\{2\}\}$ 则 $2^A=\{\phi,\{0\},\{\{1\}\},\{\{2\}\},\{0,\{1\}\},\{0,\{2\}\},\{\{1\},\{2\}\},\{0,\{1\},\{2\}\}\}$

设 $B=\{重,ε,\{理\}\}$ 则 $2^B=\{\phi,\{ε\},\{\{理\}\},\{\phi,ε\},\{\phi,\{理\}\},\{ε,\{理\}\},\{重,ε,\{理\}\}\}$

2. $R_1R_2=\{(a,b),(a,a),(b,a),(b,d)\}$

$R_2R_1=\{(b,c),(b,d),(c,b),(c,d),(d,b),(d,d)\}$

$R_1^+=\{(a,c),(a,d),(b,c),(b,d),(a,b)\}$

$R_2^+=\{(b,b),(c,a),(d,a),(c,d)\}$

$R_1^*=\{ε,(a,c),(a,d),(a,b),(b,c),(b,d)\}$

$R_2^*=\{ε,(b,b),(c,a),(d,a),(c,d)\}$

3. $\Sigma=\{a,b\}$ 字符串 abccba

前缀: ε, a, ab, abc, abcc, abccb, abccba.

真前缀: ε, a, ab, abc, abcc, abccb.

后缀: ε, a, ab, abc, abcc, abccb, abccba

真后缀: ε, a, ab, abc, abcc, abccb,

4. 证明: 如果 $A\subseteq B$, 则 $2^A\subseteq 2^B$.

证明: ∵ $2^A=\{C\mid C\subseteq A\}$. $2^B=\{D\mid D\subseteq B\}$.

$\forall A \subseteq B$

故 $\{C \mid C \subseteq A\} \subseteq \{D \mid D \subseteq B\}$

故 $2^A \subseteq 2^B$.

5. 所有以0开头的串 $\{0\}\{0,1\}^*$.

(1) $\{1,1\}\{0,1\}^*\{1,1\}$

(2) $\{01,1\}^*\{\varepsilon,00\}\{10,1\}^* \cup \{10,0\}^*\{\varepsilon,11\}\{01,0\}^*$

(3) $\{0,1\}^{2n}$ $n = 1,2\cdots$

(4) $\{0,1\}^{2n+1}$ $n = 0,1,2\cdots$

(5) $\{0,1\}^*\{01011\}\{0,1\}^*$

6.

(1) $S \to 0A$

$A \to 0A \mid 1A \mid 0 \mid 1$

(2) $S \to 11A \mid 11 \mid 111$

$A \to 0 \mid 1 \mid 0A \mid 1A$

(3) $S \to 0 \mid 1 \mid \varepsilon \mid 0A \mid 1D$

$A \to 10A \mid 01B \mid 10$

$B \to 01 \mid 01B$

$D \to 01D \mid 01 \mid 10C$

$C \to 10 \mid 10C$

(4) $S \to 00A \mid 11A \mid 01A \mid 10A \mid 00 \mid 10 \mid 11 \mid 01$

$A \to 00A \mid 11A \mid 01A \mid 10A \mid$

(5) $S \to A0 \mid 011A \mid 01 \mid 1$

$A \to 0A \mid 1A \mid 0 \mid 1$