

1.  $\Sigma = \{0,1\}$

**Regular Expression:**  $(0|1)(0|1)(0|1)(0|1)(0|1)(0|1)(0|1)(0|1)$

**Regular Grammar:**

$N = \{B, C, D, E, F, G, H, I, J\}$

$\Sigma = \{0,1\}$

$P = \{B \rightarrow 0C, B \rightarrow 1C, C \rightarrow 0D, C \rightarrow 1D, D \rightarrow 0E, D \rightarrow 1E, E \rightarrow 0F, E \rightarrow 1F, F \rightarrow 0G, F \rightarrow 1G, G \rightarrow 0H, G \rightarrow 1H, H \rightarrow 0I, H \rightarrow 1I, I \rightarrow 0J, I \rightarrow 1J, J \rightarrow \epsilon\}$

Start with letter B

Derivations:

1.  $B \rightarrow 0C \rightarrow 01D \rightarrow 010E \rightarrow 0101F \rightarrow 01010G \rightarrow 010101H \rightarrow 0101010I \rightarrow 01010101J \rightarrow 01010101$

2.  $B \rightarrow 0C \rightarrow 00D \rightarrow 000E \rightarrow 0000F \rightarrow 00001G \rightarrow 000011H \rightarrow 0000111I \rightarrow 00001111J \rightarrow 00001111$

2.  $\Sigma = \{0,1\}$

**Regular Expression:**  $(1)(0|1|\epsilon)(0|1|\epsilon)(0|1|\epsilon)(0|1|\epsilon)(0|1|\epsilon)(0|1|\epsilon)(0|1|\epsilon)$

**Regular Grammar:**

$N = \{B, C, E, F, G, H, I, J\}$

$\Sigma = \{0,1\}$

$P = \{B \rightarrow 1C, C \rightarrow 0D, C \rightarrow 1D, C \rightarrow \epsilon, D \rightarrow 0E, D \rightarrow 1E, D \rightarrow \epsilon, E \rightarrow 0F, E \rightarrow 1F, E \rightarrow \epsilon, F \rightarrow 0G, F \rightarrow 1G, F \rightarrow \epsilon, G \rightarrow 0H, G \rightarrow 1H, G \rightarrow \epsilon, H \rightarrow 0I, H \rightarrow 1I, H \rightarrow \epsilon, I \rightarrow 0J, I \rightarrow 1J, I \rightarrow \epsilon, J \rightarrow \epsilon\}$

Start with letter B

3.  $\Sigma = \{A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,U,V,W,X,Y,Z,a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w,x,y,z,0,1,2,3,4,5,6,7,8,9,\$, \_ \}$

**Regular Expression:**  $(A|B|C|D|E|F|G|H|I|J|K|L|M|N|O|P|Q|R|S|T|U|V|W|X|Y|Z|a|b|c|d|e|f|g|h|i|j|k|l|m|n|o|p|q|r|s|t|u|v|w|x|y|z|\$|\_)(A|B|C|D|E|F|G|H|I|J|K|L|M|N|O|P|Q|R|S|T|U|V|W|X|Y|Z|a|b|c|d|e|f|g|h|i|j|k|l|m|n|o|p|q|r|s|t|u|v|w|x|y|z|\$|\_0|1|2|3|4|5|6|7|8|9)^*$

**Regular Grammar:**

$N = \{\alpha, \beta\}$

$\Sigma = \{A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,U,V,W,X,Y,Z,a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w,x,y,z,0,1,2,3,4,5,6,7,8,9,\$, \_ \}$

$P = \{ \alpha \rightarrow A\beta, \alpha \rightarrow B\beta, \dots, \alpha \rightarrow Y\beta, \alpha \rightarrow Z\beta, \alpha \rightarrow a\beta, \alpha \rightarrow b\beta, \dots, \alpha \rightarrow y\beta, \alpha \rightarrow z\beta, \alpha \rightarrow \$\beta, \alpha \rightarrow \_ \beta, \beta \rightarrow A\beta, \beta \rightarrow B\beta, \dots, \beta \rightarrow Y\beta, \beta \rightarrow Z\beta, \beta \rightarrow a\beta, \beta \rightarrow b\beta, \dots, \beta \rightarrow y\beta, \beta \rightarrow z\beta, \beta \rightarrow \$\beta, \beta \rightarrow \_ \beta, \beta \rightarrow 0\beta, \beta \rightarrow 1\beta, \beta \rightarrow 2\beta, \beta \rightarrow 3\beta, \beta \rightarrow 4\beta, \beta \rightarrow 5\beta, \beta \rightarrow 6\beta, \beta \rightarrow 7\beta, \beta \rightarrow 8\beta, \beta \rightarrow 9\beta, \beta \rightarrow \epsilon \}$

Start with letter  $\alpha$