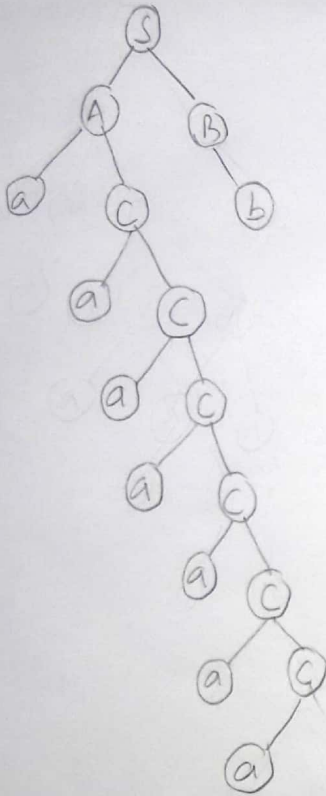


1. $\Sigma = \{a, b\}$

$$L = \{aaa^n b \mid n \geq 0\}$$

- a). $S \rightarrow AB$
 $A \rightarrow aC$
 $C \rightarrow aC \mid a$
 $B \rightarrow b$

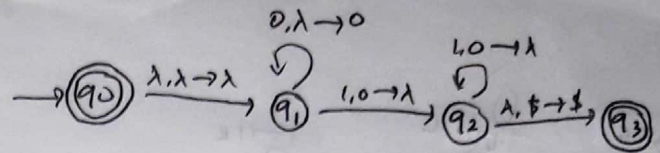
b). Penurunan Tree $aaaaaaab$



c. Bentuk normal Chomsky

- * $S \rightarrow AB$
- * $A \rightarrow DC$
- * $C \rightarrow DC \mid a$
- * $B \rightarrow b$
- * $D \rightarrow a$
- * $C \rightarrow a$

2.



a. $M = (Q, \Sigma, \Gamma, \delta, q_0, z, f)$

$$Q = \{q_0, q_1, q_2, q_3\}$$

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

$$\Gamma = \{0, 1, \phi\}$$

$$z = \phi$$

$$f = \{q_0, q_3\}$$

$$\delta = \delta(q_0, a, x) = \{(q_1, \phi)\}$$

$$\delta(q_1, 0, x) = \{(q_1, 0)\}$$

$$\delta(q_1, 1, 0) = \{(q_2, \lambda)\}$$

$$\delta(q_2, 1, 0) = \{(q_2, \lambda)\}$$

$$\delta(q_2, \lambda, \phi) = \{(q_3, \phi)\}$$

b. Instantaneous description

$$\text{Input} = 000111$$

$$(q_0, 000111, \phi) \vdash (q_1, 000111, \phi) \vdash$$

$$(q_1, 00111, 0\phi) \vdash (q_1, 0111, 00\phi) \vdash$$

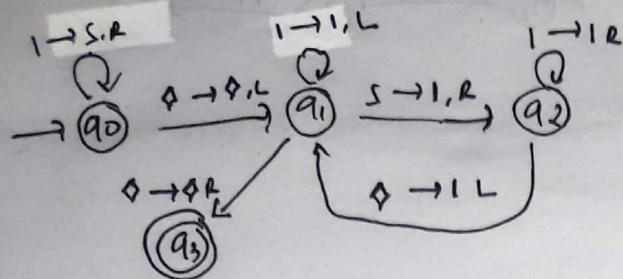
$$(q_1, 111, 000\phi) \vdash (q_2, 11, 00\phi) \vdash$$

$$(q_2, 1, 0\phi) \vdash (q_2, \lambda, \phi) \vdash (q_3, \lambda, \phi)$$

=
accepted.

$$L = \{0^n 1^m \mid n \geq 0, m \geq 0\}$$

3.



$$a. M = (Q, \Sigma, \Gamma, \delta, q_0, \diamond, F)$$

$$Q = \{q_0, q_1, q_2, q_3\}$$

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

$$\Gamma = \{1, S, \diamond\}$$

$$F = \{q_3\}$$

$$\delta = \delta(q_0, 1) = (q_0, S, R)$$

$$\delta(q_0, \diamond) = (q_1, \diamond, L)$$

$$\delta(q_1, 1) = (q_1, 1, L)$$

$$\delta(q_1, S) = (q_2, 1, R)$$

$$\delta(q_2, 1) = (q_2, 1, R)$$

$$\delta(q_2, \diamond) = (q_1, 1, L)$$

$$\delta(q_2, \diamond) = (q_3, \diamond, R)$$