# Digital Assignment-2

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1. given context grammar is

$S \rightarrow aB|bA$

$A \rightarrow a/aS/bAA$

$B \rightarrow b/bS/aBB$

we need to generate string aaabbabbba

a) left most derivation;

Consider; $S \rightarrow aB$

$\rightarrow aaBB$

$\rightarrow aaaBBB$

$\rightarrow aaabBB$

$\rightarrow aaabbB$

$\rightarrow aaabbaBB$

$\rightarrow aaabbaBB$

$\rightarrow aaabbabB$

$\rightarrow aaabbabbS$

$\rightarrow aaabbabbbA$

$\rightarrow aaabbabbba$

b) right most derivation:

Consider; $S \rightarrow aB$

$S \rightarrow aaBB$

$S \rightarrow aaBaBB$

$S \rightarrow aaBaBbS$

$S \rightarrow aaBaBbbA$

$S \rightarrow aaBaBbba$

$S \rightarrow aaBabbba$

$S \rightarrow aaaBBabbba$

$S \rightarrow aaaBbabbba$

$S \rightarrow aaabbabbba.$

2. The context free grammar for

$L = \{a^n b^m c d^m e^n \mid n, m > 0\}$

$L = \{abcde, aabcdee, \ldots\ldots\}$

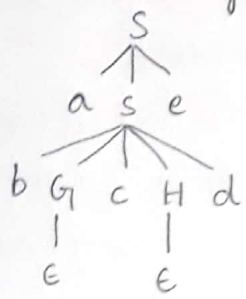
The grammar is

$S \rightarrow aSe \mid bGcHd$

$G \rightarrow b \mid \epsilon \mid G$

$H \rightarrow d \mid \epsilon \mid H$

For string abcde




3. 1) $L = \{a^m b^{2m}\}$

$L = \{abb, aabbbb, aaabbbbbb. \ldots\ldots\}$

Consider string aabbbbϵ

$\delta(q_0, a, z_0) = q_0, az_0$

$\delta(q_0, a, a) \rightarrow q_0, aa$

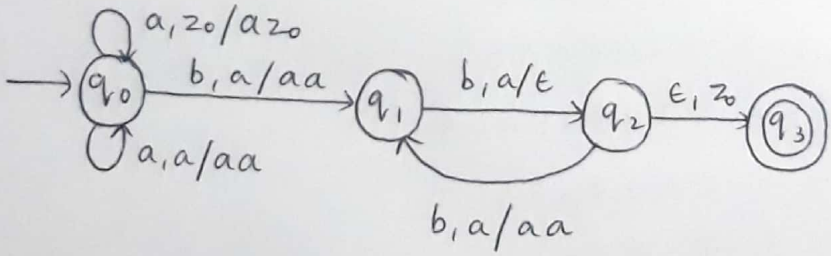
$\delta(q_0, b, a) \rightarrow q_1, aa$

$\delta(q_1, b, a) \rightarrow q_2, \epsilon$

$\delta(q_2, b, a) \rightarrow q_1, aa$

$\delta(q_1, b, a) \rightarrow q_2, \epsilon$

$\delta(q_2, \epsilon, z_0) \rightarrow q_3$, accept



3. a) $L = \{ww^R \mid w = \{a,b\}^*\}$

$L = \{aa, bb, abba, baab \ldots\}$

Consider;

$\delta(q_0, a, z_0) \rightarrow q_1, az_0$

$\delta(q_0, b, z_0) \rightarrow q_1, bz_0$

$\delta(q_1, a, a) \rightarrow q_2, aa$

$\delta(q_1, b, b) \rightarrow q_2, bb$

$\delta(q_1, a, b) \rightarrow q_2, ab$

$\delta(q_1, b, a) \rightarrow q_2, ba$

$\delta(q_2, a, a) \rightarrow q_2, \epsilon$

$\delta(q_2, b, b) \rightarrow q_2, \epsilon$

$\delta(q_2, \epsilon, z_0) \rightarrow q_3$, accept