

Model A:

1) Consider the following CFG , what is the equivalent RE for this CFG?

$$S \rightarrow a X$$

$$X \rightarrow a X \mid b X \mid \epsilon$$

2) Eliminate left factoring from the following grammar:

$$E \rightarrow \text{int} \mid \text{int} + E \mid \text{int} - E \mid E - (E)$$

Answer:

1- $a(a+b)^*$

2- Left factoring

$$E \rightarrow \text{int } E' \mid E - (E)$$

$$E' \rightarrow \epsilon \mid + E \mid - E$$

left recursion:

$$E \rightarrow \text{int } E' B$$

$$B \rightarrow - (E) B \mid \epsilon$$

$$E' \rightarrow \epsilon \mid + E \mid - E$$

Model B:

1) Consider the following CFG , what is the equivalent RE for this CFG?

$$S \rightarrow X a X a X$$

$$X \rightarrow a X \mid b X \mid \epsilon$$

2) Eliminate left recursion from the following grammar:

$$A \rightarrow A + B \mid B$$

$$B \rightarrow \text{int} \mid (A)$$

Answer:

1- $(a+b)^* a (a+b)^* a (a+b)^*$

2- $A \rightarrow B A'$

$$A' \rightarrow + B A' \mid \epsilon$$

$$B \rightarrow \text{int} \mid (A)$$

Model C:

1) Consider the following CFG, what is the equivalent RE for this CFG?

$$S \rightarrow XY$$

$$X \rightarrow aX \mid \epsilon$$

$$Y \rightarrow bY \mid \epsilon$$

2) Remove the right factoring and right recursion from this grammar.

$$S \rightarrow T \mid U$$

$$U \rightarrow bU \mid c$$

$$T \rightarrow Ta \mid Xa \mid z$$

$$X \rightarrow x \mid b$$

Answer:

1- a^*b^*

2- $S \rightarrow T \mid U$

$$U \rightarrow U'c$$

$$U' \rightarrow U'b \mid \epsilon$$

$$T \rightarrow T'a \mid z$$

$$T' \rightarrow T \mid X$$

$$X \rightarrow x \mid b$$