

Ex: 5.4.7

The following grammar generates prefix expressions with operands x and y and binary operations $+$ $-$ and $*$

$$E \rightarrow +EE \mid *EE \mid -EE \mid x \mid y$$

① ②
③ ④ ⑤

(i)

$$E \rightarrow +EE \text{ --- ①}$$

$$E \rightarrow *EE \text{ --- ②}$$

$$E \rightarrow -EE \text{ --- ③}$$

$$E \rightarrow x \text{ --- ④}$$

$$E \rightarrow y \text{ --- ⑤}$$

Leftmost

$$E \xrightarrow{①} +EE \xrightarrow{②} +*EEE \xrightarrow{③} +*-EEEE \xrightarrow{④} +*-xEEE$$

$$\xrightarrow{⑤} +*-xyEE \xrightarrow{④} +*-xyxE \xrightarrow{⑤} +*-xxyxy$$

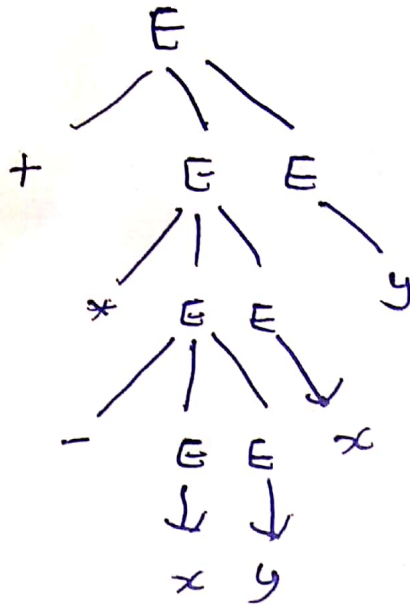
Rightmost

$$E \xrightarrow{①} +EE \xrightarrow{②} +*EEE \xrightarrow{③} +*-EEEE \xrightarrow{⑤} +*-EEEx \xrightarrow{④} +*-Eyxxy \xrightarrow{⑤} +*-xyxxy$$

$$\xrightarrow{④} +*-xyxxy$$

⊕

Parse tree for the derivation of $+*x-xyxy$



(ii) As shown from the leftmost and rightmost derivation of $+*x-xyxy$. The grammar $+*-xyxy$ can be derived from both the derivations therefore the grammar given is unambiguous proved by the given example.