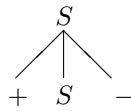


Solution to Homework 7

Task: Show, step by step, how the grammar with rules $S \rightarrow \varepsilon$ and $S \rightarrow +S-$ will generate the word $++--$.

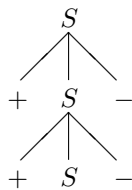
Solution. In this language, there is only one variable S , so this variable is a starting variable.

To this variable, we can apply either the first rule or the second rule. If we apply the rule $S \rightarrow \varepsilon$, then we get the empty string. So, to derive a non-empty word $++--$, we need to start with the second rule $S \rightarrow +S-$. So, we got the following derivation tree:



In the resulting word $+S-$, we have a variable S . If we apply the rule $S \rightarrow \varepsilon$ to this word, we get the word $+-$. Thus, to get a different word, we need to apply the second rule, i.e., get the derivation

$$S \rightarrow +\underline{S}- \rightarrow ++S--$$



To the resulting word $++S--$, we can apply each of the two rules. If we apply the first rule, we get exactly the desired word $++--$:

$$S \rightarrow +\underline{S}- \rightarrow ++\underline{S}-- \rightarrow ++--$$

