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1. $L = \{a^x b^y c^z : z = x+y\}$

$S \to A$

$A \to aAc \mid B \mid \lambda$

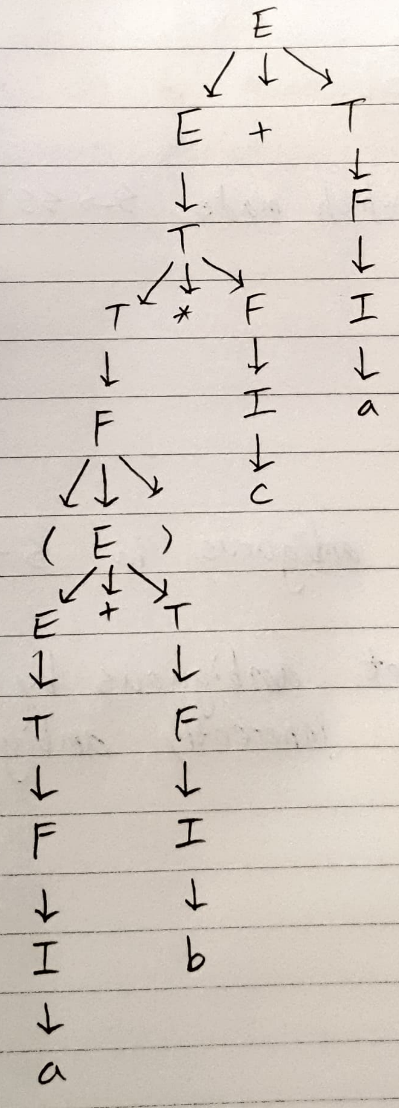
$B \to bBc \mid \lambda$

2. $L = \{a^n b^n : n \text{ is not multiple of } 3\}$

$S \to aS_1b \mid aaS_1bb$

$S_1 \to aaaS_1bbb \mid \lambda$

3.



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4. To prove the language is not inherently ambiguous, we have to find the grammar which is not ambiguous.

· $S \to SS \mid aSb \mid \lambda$ is ambiguous

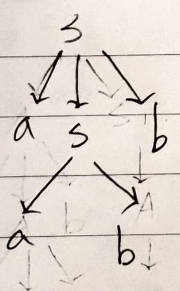
$S \Rightarrow SS \Rightarrow aSbS \Rightarrow aaSbbS \Rightarrow aabb$

$S \Rightarrow aSb \Rightarrow aaSbb \Rightarrow aabb$.

Let's find equivalent grammar which is not ambiguous.

$S \to SS \mid aSb \mid ab$

In case of 'aabb' which made $S \to SS \mid aSb \mid \lambda$ ambiguous,



So, aabb is not ambiguous in $S \to SS \mid aSb \mid ab$.

As the language is not ambiguous by $S \to SS \mid aSb \mid ab$, the language is not inherently ambiguous.

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5. Since G is a context-free grammar where every variable occurs on the left side of at most one production, the grammar G will generate one leftmost derivation in the derivation tree when it terminals. As ambiguity implies the existence of two or more leftmost or rightmost derivations according to definition 5.5 in the textbook, G has only one leftmost derivation so that G is unambiguous.

Thus, G is unambiguous because it has only one leftmost derivation in derivation tree of G.