

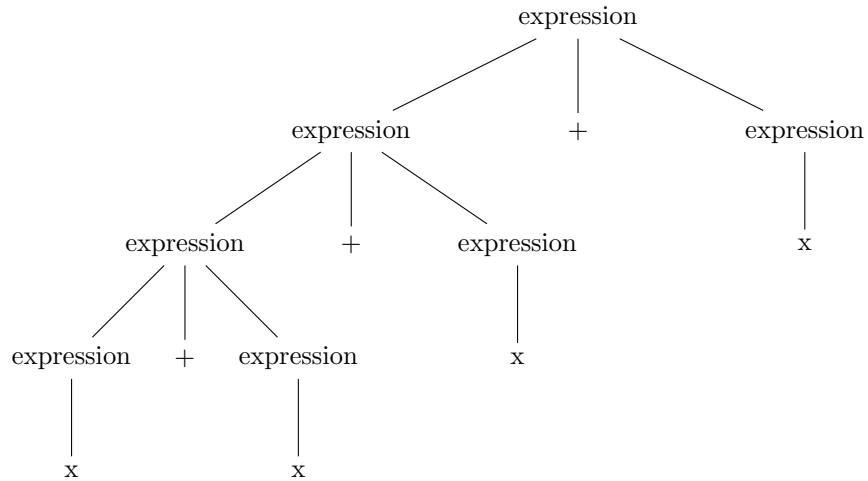
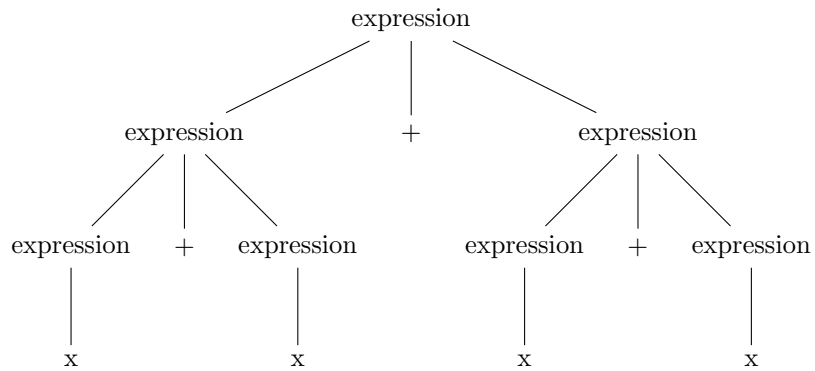
MAU11602 Assignment 1, Due Wednesday 7 February 2024
Solutions

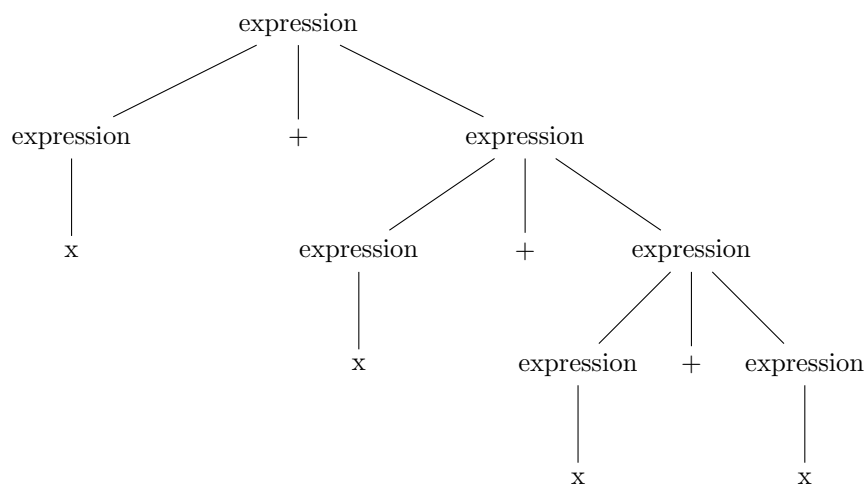
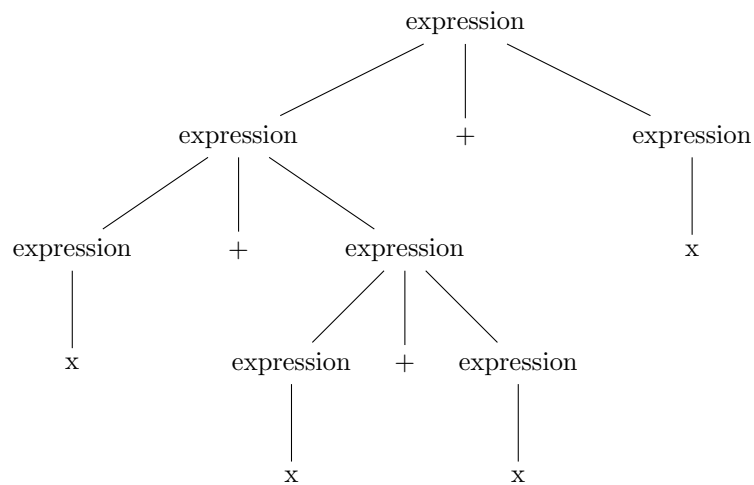
1. The grammar

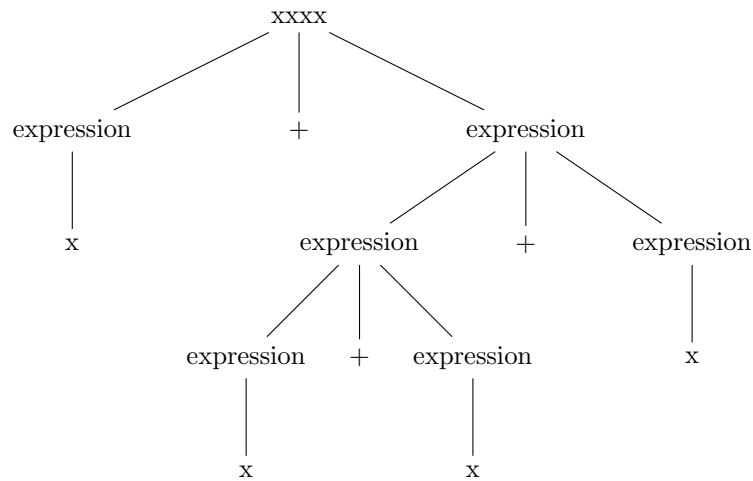
expression : "x" | **expression** "+" **expression**

appeared in lecture as an example of an ambiguous grammar. The string $x + x + x + x$, for example, has multiple parsings. How many does it have?

Solution: Each of the following parse trees is possible:







So there are five possible parsings.

2. Write down two unambiguous grammars for the language of strings of an odd number of x's.

Solution: One such grammar is

odd : "x" even

even : | "x" odd

Another is

odd : even "x"

even : | odd "x"

3. Do the following two grammars generate the same language?

(a) **start** :

(b) **start** : **start**

Solution: No. The first one generates the empty string, and only the empty string. The second one doesn't generate anything at all, since the start symbol can only be replaced by itself so we never get anywhere. There is a difference between a set containing only the empty string and an empty set of strings.