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Programming Paradigms (SS 2023)
Homework sheet 1

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Question 1 (Derivation)

Consider the following grammar:

<Expr> ::= <Expr> + <Term> | <Expr> - <Term> | (<Expr>) | <Term>
<Term> ::= 0|1|2|3|4|5|6|7|8|9

I. Can you derive 3−4+8+9 using the above grammar? If yes, then provide the derivation; else, extend the grammar (with minimal production rules) to support this.
II. Can you derive 3 + 4 − (2+3) in this grammar? If yes, then provide the derivation; else, extend the grammar (with minimal production rules) to support this.

Question 2 (Parse Tree)

Consider the following grammar:

<Expr> ::= + <Expr> <Expr> | * <Expr> <Expr> | 0 | 1 | … | 9

draw a parse tree for:

I. + 5 * 4 3
II. + * 5 4 3

Question 3 (Ambiguous Grammar)

Create an example ambiguous grammar and show it via a parse tree. Make this grammar unambiguous.