Assignment 6 (Optional)

Exercise 1 (LLVM Code Generation, 10 Bonus Points)

Based on the simple LLVM example program (fibonacci.cpp, see our class website), create an LLVM-based “subscript”-compiler for simple binary arithmetic expressions. Example: \((v_0 + v_1) \times (v_2 - v_3)\), in tree representation:

```
  ×
 /  \
+   −
|    |
v0   v1
  |
v2  v3
```

Write a function similar to `CreateFibFunction` that takes an `llvm::Module` (like fibonacci.cpp), an `llvm::LLVMContext` (like fibonacci.cpp) and the root of a binary arithmetic expression tree as parameters. The tree’s nodes contain the operators \(\times, \div, +, -\), constants and variables \((v_0, \ldots, v_{n-1})\).

The function generates a function \(f\) that can be called with \(n\) integer arguments and returns the result of the expression, e.g. in the example above \(f(1, 2, 5, 2)\) returns 9 (since \((1 + 2) \times (5 - 2) = 9\).

Your code may be completely independent from your database system’s code base.