

# Homework 2

## Lex & Yacc

### Objective

Use Lex and Yacc to implement an advanced calculator.

### Program description

In this project, you are going to write a calculator program using *Lex* and *Yacc*. The program reads an input file consisting of several commands, and then prints out the result of each command. In the given input file, each line has a statement that is a command. A statement has the following format:

**variable = expression**, which means that the value of the variable is the result of the expression. An expression consists of a number, variable or a combination of numbers and variables joined by operations. Here, **a number is a positive real number. The name rule for variables is the same with that for identifiers in C language.**

The operations allowed are as follows:

Operations	Descriptions	Examples
+	add	3+5, a+2
-	subtract	5-a, 6-3
neg()	negate	neg(5)
*	multiply	3*3, a*b
/	divide	4%3
^	raise to power	2^3, a^b
abs()	absolute	abs(-3), abs(a*b)
cos()	cosine	cos(6), cos(a+b)
sin()	sine	Sin(3), sin(b)
log()	Based-10 logrithm	Log(100), log(v)
%	Modulo	9%2
++	Increment	++a, a++
--	decrement	--a, a--

The priorities of the operations from high to low are as follows:

- `neg()`, `abs()`, `cos()`, `sin()`, `log()`, `^`, `++`, `--`
- `*`, `/`, `%`
- `+`, `-`

Left associativity is used when two operations have the same priorities.

Additionally, you can use **grouping symbols ( )** to group operations that need to be done before Others.

## Requirements

Once your program reads a statement, it needs to print out the value of the variable on the left side of the statement. When your program finds a syntax error, it needs to print out a message showing which line has the syntax error and the lookahead tokens. For example: **Line 2: syntax error with token `"**"`**.

<b>Input Example 1</b> <code>var1 = neg(3) - 5</code> <code>var2 = 10 + var1</code> <code>var3 = log(100) + 10</code> <code>var4 = abs(var1) - var2 * cos(5)</code> <code>var5 = sin(var2) + 2^2 * var3 - (var2 + var1)</code> <code>var6 = var3^var2</code>	<b>Output Example 1</b> -8 2 12 7.43267 54.90929 144
<b>Input Example 2</b> <code>var1 = 3-5</code> <code>var2 = 2**2*2</code>	<b>Output Example 2</b> -2 Line 2: syntax error with token <code>"**"</code>
<b>Input Example 3</b> <code>var1 = 3-5</code> <code>var2 = 2*var3*2</code>	<b>Output Example 3</b> -2 Line 2: <code>var3</code> is undefined

## Deliveries

1. Your lex and yacc source codes
2. The execution results for processing the given examples

## Note

1. The deadline is 5/24. Please remember to upload your files to portal by 5/24. No late delivery is allowed.
2. We have 2 stages for submission. The first state is before 5/12, the final deadline is 5/24.