

## Exercise 5

### Basic Calculator using Lex and Yacc

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#### 1 Yacc Program

```
%{
#include<stdio.h>
#include<stdlib.h>
#include<math.h>
int yylex(void);
#include "y.tab.h"
}%
%token INTEGER
%%
program: line program
        | line
line: expr '\n' { printf("%d\n", $1); }
expr: expr '+' mulex { $$ = $1 + $3; }
      | expr '-' mulex { $$ = $1 - $3; }
      | mulex { $$ = $1; }
mulex: mulex '*' powex { $$ = $1 * $3; }
      | mulex '/' powex { $$ = $1 / $3; }
      | powex { $$ = $1; }
powex: powex '^' term { $$ = pow($1, $3); }
      | term { $$ = $1; }
term: '(' expr ')' { $$ = $2; }
      | INTEGER { $$ = $1; }
%%
int yyerror(char* s)
{
    fprintf(stderr, "%s\n", s);
    return 0;
}
int yywrap()
{

```

```

    return 1;
}
int main()
{
    yyparse();
    return 0;
}

```

## 2 Lex Program

```

%{
#include<stdio.h>
#include<stdlib.h>
#include<string.h>
#include "y.tab.h"
extern int yylval;
}%
%%
[0-9]+ { yylval = atoi(yytext); return INTEGER; }
("+|-|*|/|^|\"|\"|\"\\n\") { return *yytext; }
. {
    char err[25];
    sprintf(err, "Invalid character: %s\\n", yytext);
    yyerror(err);
}

```

## 3 Sample Input & Output

```

$ cat in.txt
3+9
3+9*6
(3+4)*7
(3-4)+(7*6)
5/7+2
4^2^1
(2^3)^2
$ ./calculator.out < in.txt
12
57
49
41
2
16
64

```