Lab Assignment 3

Garvit Shah
U21CS089

1. Write a Lex program to compute area of a circle.

```
%{
#include <stdio.h>
#include <stdlib.h>
#include <math.h>
%}

DIGIT [0-9]
%%
{DIGIT}+(\.{DIGIT}+)? {
    float radius = atof(yytext);
    float area = M_PI * radius * radius;
    printf("The area of the circle with radius %.2f is: %.2f\n", radius,
area);
}
\n   ; /* ignore newline characters */
.    ; /* ignore all other characters */
%%

int main() {
    yylex();
    return 0;
}
```

```
» ~/D/C/V/S/L/Assign3 ./lexical_analyzer
3
The area of the circle with radius 3.00 is: 28.27
```

2. Write a Lex program to calculate the simple interest.

```
%{
#include <stdio.h>
#include <stdlib.h>
%}

DIGIT [0-9]
%%
{DIGIT}+(\.{DIGIT}+)? {
    float principal = atof(yytext);
    float rate, time;
    printf("Enter the rate of interest: ");
    scanf("%f", &rate);
    printf("Enter the time period: ");
    scanf("%f", &time);
    float simple_interest = (principal * rate * time) / 100.0;
    printf("The simple interest is: %.2f\n", simple_interest);
    printf("Total amount after interest is: %.2f\n", principal +
simple_interest);
    return 0;
```

```
}
\n    ; /* ignore newline characters */
.     ; /* ignore all other characters */
%%

int main() {
    printf("Enter the principal amount: ");
    yylex();
    return 0;
```

```
~/D/C/V/S/L/Assign3 ./q2_lexical_analyzer
Enter the principal amount: 100
Enter the rate of interest: 1
Enter the time period: 10
The simple interest is: 10.00
Total amount after interest is: 110.00
```

3. Write a Lex program that convert Fahrenheit to Celsius.

```
%{
#include <stdio.h>
#include <stdlib.h>
%}

DIGIT [0-9]
%%
{DIGIT}+(\.{DIGIT}+)? {
    float farhen = atof(yytext);
    float celcius = (float)(((farhen - 32)*5)/9);
    printf("The temperature in Celcius: %f\n", celcius);
    return 0;
}
\n    ; /* ignore newline characters */
.     ; /* ignore all other characters */
%%

int main() {
    printf("Enter the temp in farhenheit: ");
    yylex();
    return 0;
}
```

```
~/D/C/V/S/L/Assign3 ./q3_lexical_analyzer
Enter the temp in farhenheit: 98.6
The temperature in Celcius: 37.000000
```

4. Write a Lex program to swap two number with and without using temporary variable.

```
%{
#include <stdio.h>
#include <stdlib.h>
%}

DIGIT [0-9]
%%
{DIGIT}+(\.{DIGIT}+)? {
    int a = atof(yytext);
    int b;
    printf("Enter the second number: ");
    scanf("%d", &b);
    a = a + b;
    b = a - b;
    a = a - b;
    printf("The swapped numbers are -- first: %d, second: %d", a, b);
    return 0;
}
\n   ; /* ignore newline characters */
.    ; /* ignore all other characters */
%%

int main() {
    printf("Enter the first number: ");
    yylex();
    return 0;
}
```

```
~/D/C/V/S/L/Assign3 ./q4_lexical_analyzer
Enter the first number: 12
Enter the second number: 22
The swapped numbers are -- first: 22, second: 12
```

5. Write a Lex program that read two number and performs their division. If the division is not possible, then an error message, “Division not possible” is displayed.

```
%{
#include <stdio.h>
#include <stdlib.h>
%}

DIGIT [0-9]
%%
{DIGIT}+(\.{DIGIT}+)? {
    int a = atof(yytext);
    int b;
    printf("Enter the second number: ");
    scanf("%d", &b);
    if(b == 0){
        printf("Error: Division not possible!");
    }
    else{
```

```
        printf("Divison of %d with %d is %f", a, b, (float)a/b);
    }
    return 0;
}
\n    ; /* ignore newline characters */
.     ; /* ignore all other characters */
%%

int main() {
    printf("Enter the first number: ");
    yylex();
    return 0;
}
```

```
~/D/C/V/S/L/Assign3 ./q5_lexical_analyzer
Enter the first number: 25
Enter the second number: 5
Divison of 25 with 5 is 5.000000
~/D/C/V/S/L/Assign3
```

6. Write a Lex program to recognize valid arithmetic expression and identify the identifiers and operators.

```
%{
#include <stdio.h>
#include <stdlib.h>
%}

/* Regular expressions for tokens */
DIGIT [0-9]
LETTER [a-zA-Z]
ID {LETTER}({LETTER}|{DIGIT})*
OPERATOR [\+\-\*\/]

%%
{ID}     printf("Identifier: %s\n", yytext);
{OPERATOR}    printf("Operator: %s\n", yytext);
{DIGIT} printf("Digit or Operand: %s\n", yytext);
[ \t\n]    return 0;   ; /* skip whitespace and newline */
.        {printf("Invalid character: %s\n", yytext);return 0;}
%%

int main() {
    printf("Enter an arithmetic expression (without spaces): ");
    yylex();
    return 0;
}
```

```
~/D/C/V/S/L/Assign3 ./q6_lexical_analyzer
Enter an arithmetic expression: 3+a
Digit or Operand: 3
Operator: +
Identifier: a
~/D/C/V/S/L/Assign3
```

7. Write a Lex program to count the Positive numbers, Negative numbers and Fractions.

```
%{
#include <stdio.h>
#include <stdlib.h>

int neg = 0,pos = 0,frac = 0;
%}

/* Regular expressions for tokens */
DIGIT [0-9]

%%
\-{DIGIT}+ {neg++;}
{DIGIT}+\.{DIGIT}+ {frac++;}
{DIGIT}+ {pos++;}
. | \n ;

%%

int yywrap(void){
    printf("Total no. of positive numbers: %d\n Total no. of negative
numbers: %d\n Total no. of fractions: %d", pos, neg, frac);
    return 1;
}

int main() {
    printf("Enter numbers: ");
    yylex();

    return 0;
}
```

```
~/D/C/V/S/L/Assign3 ./q7_lexical_analyzer
Enter numbers: 3 4 -10 -1 3.24

Total no. of positive numbers: 2
 Total no. of negative numbers: 2
 Total no. of fractions: 1
```