Q1. WRITE A LEX PROGRAM TO CHECK WHETHER THE GIVEN NUMBER IS PALINDROME OR NOT?

SOURCE CODE:

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

%%

[a-zA-Z]+   {
            int i = 0;
            int j = strlen(yytext) - 1;
            int palindrome = 1;

            while (i < j) {
               if (yytext[i] != yytext[j]) {
                  palindrome = 0;
                  break;
               }
               i++;
               j--;
            }

            if (palindrome) {
               printf("%s is a palindrome.\n", yytext);
            } else {
               printf("%s is not a palindrome.\n", yytext);
            }
         }

%%

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

OUTPUT:

```
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ lex lab.l
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ cc lex.yy.c -lfl
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ ./a.out
abcde
abcde is not a palindrome.

abcba
abcba is a palindrome.
```

Q2. WRITE A LEX PROGRAM TO IDENTIFY THAT THE GIVEN NUMBER IS POSITIVE NUMBER OR NEGATIVE NUMBER.

SOURCE CODE:

```
/* Lex program to Identify and Count
Positive and Negative Numbers */
%{
int positive_no = 0, negative_no = 0;
%}

/* Rules for identifying and counting
positive and negative numbers*/
%%
^[-][0-9]+ {negative_no++;
          printf("negative number = %s\n",
               yytext);}  // negative number

[0-9]+ {positive_no++;
       printf("positive number = %s\n",
              yytext);} // positive number
%%

/*** use code section ***/

int yywrap(){}
int main()
{

yylex();
printf ("number of positive numbers = %d,"
       "number of negative numbers = %d\n",
             positive_no, negative_no);

return 0;
}
```

OUTPUT:

```
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ lex lab.l
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ cc lex.yy.c -lfl
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ ./a.out
20
positive number = 20

-20
negative number = -20
```

Q3. WRITE A LEX PROGRAM TO CHECK WHETHER THE GIVEN YEAR IS LEAP YEAR OR NOT.

SOURCE CODE:

```
%{
void check(char *);
%}
/*Rule Section*/
%%
[0-9] ;
[0-9][0-9] ;
[0-9][0-9][0-9] ;
[0-9][0-9][0-9][0-9] { printf("%s", yytext);check(yytext); }
[0-9][0-9][0-9][0-9][0-9]+ ;
%%
int main()
{
extern FILE *yyin;
yyin=fopen("num", "r");
// The function that starts the analysis
yylex();
return 0;
}
void check(char *a)
{
int x=0, i;
for(i=0;i<4;i++)
x=x*10+(a[i]-'0');if(x%400==0)
printf("\tleap year\n");
else if(x%4==0&&x%100!=0)
printf("\tleap year\n");
else
printf("\tnot a leap year\n");
}
```

OUTPUT:

```
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ lex lab.l
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ cc lex.yy.c -lfl
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ ./a.out
2004
2004    leap year

2005
2005    not a leap year
```

Q4. WRITE A LEX PROGRAM TO CHECK WHETHER THE GIVEN NUMBER IS ARMSTRONG NUMBER OR NOT.

SOURCE CODE:

```
%{
#include<stdio.h>
#include<stdlib.h>
#include<math.h>
%}
%%
[0-9]+ {int num=atoi(yytext);
int n=0,sum=0,temp=num;
while(temp>0)
{
n++;
temp=temp/10;
}
temp=num;
while(num>0)
{
int pow=1;
for(int i=0;i<n;i++)
pow*=num%10;
sum+=pow;
num=num/10;
}
if(temp==sum)
printf("Armstrong Number\n");
else
printf("Not an Armstrong Number\n");
} ;
\n ;
%%
int main()
{
printf("Enter a number:\n"); yylex();
return 0;
}
int yywrap()
{
return 1;}
```

OUTPUT:

```
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ lex lab.l
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ cc lex.yy.c -lfl
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ ./a.out
Enter a number:
112
Not an Armstrong Number
153
Armstrong Number
```

Q5.WRITE A LEX PROGRAM THAT COUNTS THE NUMBER OF KEYWORDS.

SOURCE CODE:

```
%{
#include<stdio.h>
#include<string.h>
int i = 0;
%}

/* Rules Section*/
%%
([a-zA-Z0-9])* {i++;} /* Rule for counting
                                                    number of words*/

"\n" {printf("%d\n", i); i = 0;}
%%

int yywrap(void){}

int main()
{
        // The function that starts the analysis
        yylex();

        return 0;
}
```

OUTPUT:

```
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ lex lab.l
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ cc lex.yy.c -lfl
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ ./a.out
Himanshi Rana Graphic Era Dehradun 20
     6
Himanshi Rana
 2
```

Q6. WRITE A LEX PROGRAM THAT ACCEPTS A DFA ENDS WITH 11.

SOURCE CODE:

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

%option noyywrap

%%

0(0|1)*11       { printf("Accepted\n"); }
0(0|1)*         { printf("Rejected\n"); }

.               ;

%%

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

OUTPUT:

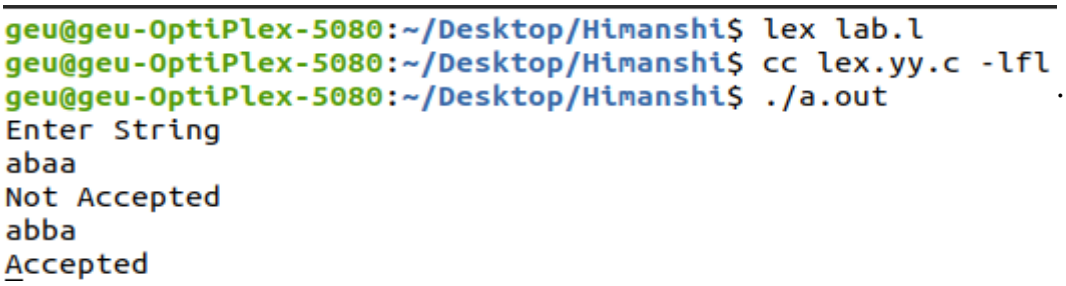
```
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ lex lab.l
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ cc lex.yy.c -lfl
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ ./a.out
1011
Accepted

1101
Rejected
```

Q7. WRITE A LEX PROGRAM THAT ACCEPTS A DFA WHICH CONTAINS EVEN NUMBER OF A.

SOURCE CODE:

```
%{
%}
%s A DEAD
%%
<INITIAL>a BEGIN A;
<INITIAL>b BEGIN INITIAL;
<INITIAL>[^ab\n] BEGIN DEAD;
<INITIAL>\n BEGIN INITIAL; {printf("Accepted\n");}
<A>a BEGIN INITIAL;
<A>b BEGIN A;
<A>[^ab\n] BEGIN DEAD;
<A>\n BEGIN INITIAL; {printf("Not Accepted\n");}
<DEAD>[^\n] BEGIN DEAD;
<DEAD>\n BEGIN INITIAL; {printf("Invalid\n");}
%%
int yywrap(){
return 1;
}
int main()
{
printf("Enter String\n");
yylex();
return 0;}
```

OUTPUT:



Q8. WRITE A LEX PROOGRAM THAT ACCEPTS A DFA WITH ABC.

SOURCE CODE:

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

%option noyywrap

%%

abc             { printf("Accepted\n"); }
a(b|c)          { printf("Rejected\n"); }
b(a|c)          { printf("Rejected\n"); }
c(a|b)          { printf("Rejected\n"); }

.               ;

%%

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

OUTPUT:

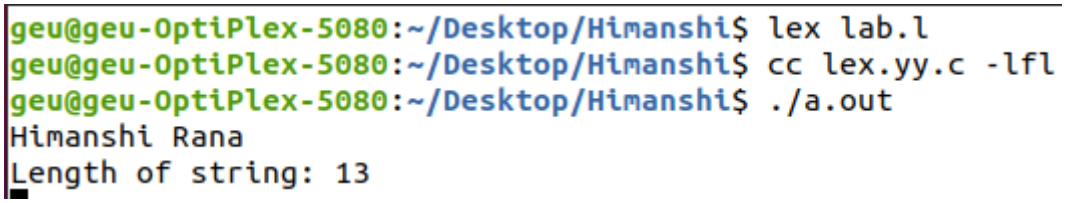
```
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ lex lab.l
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ cc lex.yy.c -lfl
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ ./a.out
abc
Accepted

abb
Rejected
```

Q9. WRITE A LEX PROGRAM TO COUNT THE LENGTH OF A STRING.

SOURCE CODE:

```
%{
#include <stdio.h>
int count = 0;
%}

%option noyywrap

%%

.       { count++; }

\n      { printf("Length of string: %d\n", count); }

%%

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

OUTPUT:

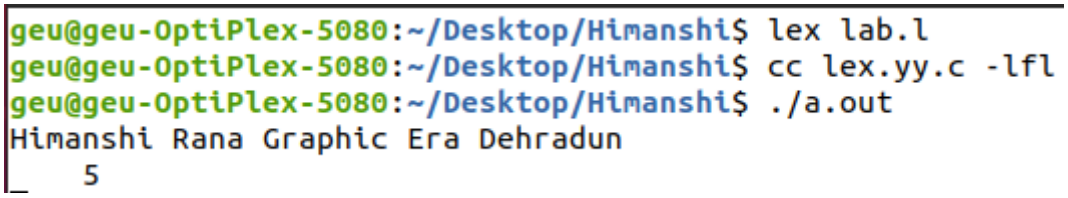


Q10. WRITE A LEX PROGRAM TO COUNT NUMBER OF WORDS.

SOURCE CODE:

```
%{
#include<stdio.h>
#include<string.h>
int i = 0;
%}

/* Rules Section*/
%%
([a-zA-Z0-9])* {i++;} /* Rule for counting
                                                    number of words*/

"\n" {printf("%d\n", i); i = 0;}
%%

int yywrap(void){}

int main()
{
        // The function that starts the analysis
        yylex();

        return 0;
}
```

OUTPUT:



Q11.WRITE A LEX PROGRAM FOR BINARY TO DECIMAL CONVERSION.

SOURCE CODE:

```
%{
#include <stdio.h>
int decimal = 0;
%}

%%
[01]+   {
          for (int i = 0; i < strlen(yytext); i++) {
             decimal = decimal * 2 + (yytext[i] - '0');
          }
          printf("%d\n", decimal);
          decimal = 0;
        }
\n      {
          // Do nothing on newlines
        }
.       {
          printf("Invalid input\n");
        }
%%

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

OUTPUT:

```
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ lex lab.l
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ cc lex.yy.c -lfl
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ ./a.out
1011
11
1111
15
0111
7
```

Q12. WRITE A LEX PROGRAM THAT ACCEPTS ALL EVEN NO. OF A AND B.

SOURCE CODE:

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

%%

(a{2}b{2})* {
   printf("Accepted.\n");
}

a{2}b{0,1}|a{0,1}b{2} {
   printf("Rejected.\n");
}

. ;

%%

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

OUTPUT:

```
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ lex lab.l
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ cc lex.yy.c -lfl
geu@geu-OptiPlex-5080:~/Desktop/Himanshi$ ./a.out
aabb
Accepted.

abbb
Rejected.

aaab
Rejected.
```