NATIONAL INSTITUTE OF TECHNOLOGY MIZORAM

COMPILER DESIGN LAB ASSIGNMENT

Name: NIRAJ KUMAR

Department: CSE

Enrollment No. : BT19CS031

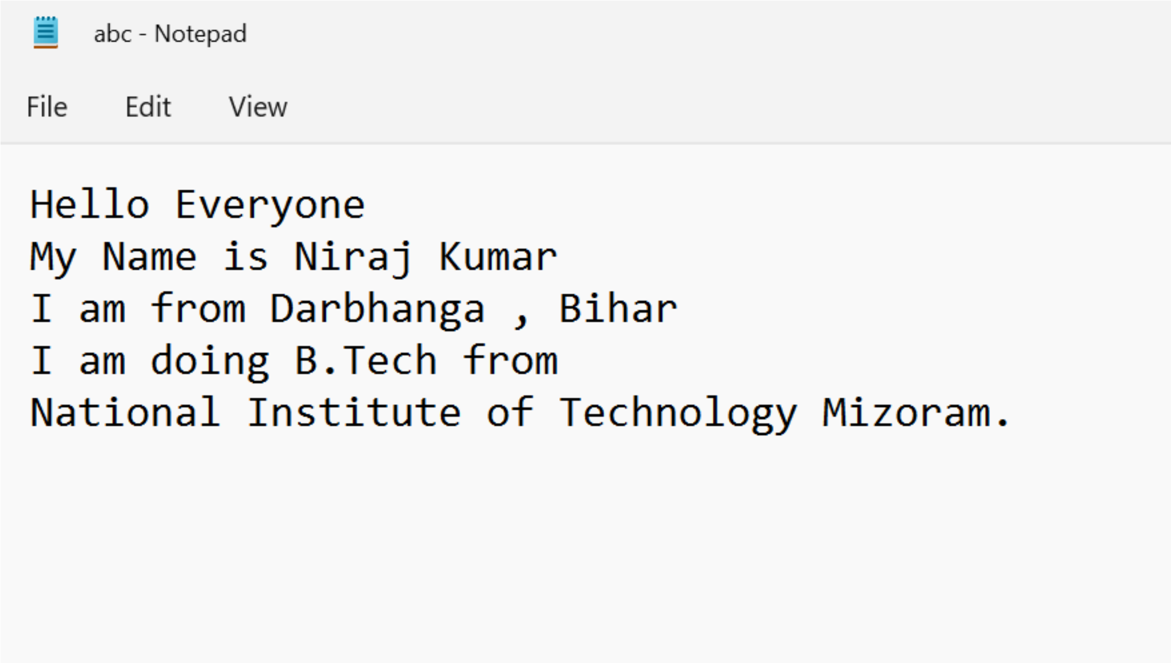
Program 1: To count the number of characters and lines in a text file.

[github link to question1]

```
/* Lex Program To count the number of characters and lines
         in a text file */


/* Definitions
  Declaration Section */
%{
#include<stdio.h>
#include<conio.h>
int n_char = 0 , n_lines = 0;  /* Global Variables */
%}


/* Rules Section
  Translation Rules */
%%
\n {++n_lines, ++n_char;}
. ++n_char;
```

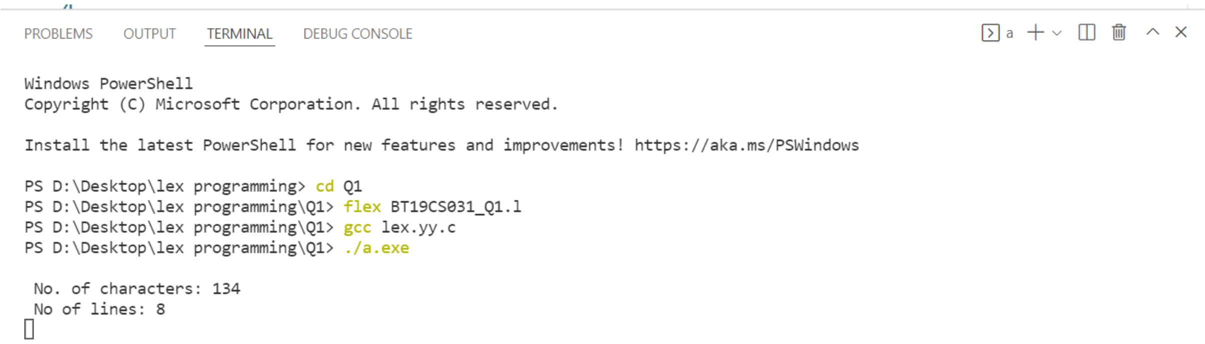
```
%%
/* User Subroutines
   Auxiliary Procedure Section */

int yywrap()
{
return 1;
}

int main(int argc[],char *argv[])
{
yyin=fopen("abc.txt","r");
yylex();
printf("\n No. of characters: %d",n_char);
printf("\n No of lines: %d \n",n_lines);
getch();
return 0;
}
```

abc.txt file



```
Hello Everyone
My Name is Niraj Kumar
I am from Darbhanga , Bihar
I am doing B.Tech from
National Institute of Technology Mizoram.
```

output



```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS D:\Desktop\lex programming> cd Q1
PS D:\Desktop\lex programming\Q1> flex BT19CS031_Q1.l
PS D:\Desktop\lex programming\Q1> gcc lex.yy.c
PS D:\Desktop\lex programming\Q1> ./a.exe

 No. of characters: 134
 No of lines: 8
```

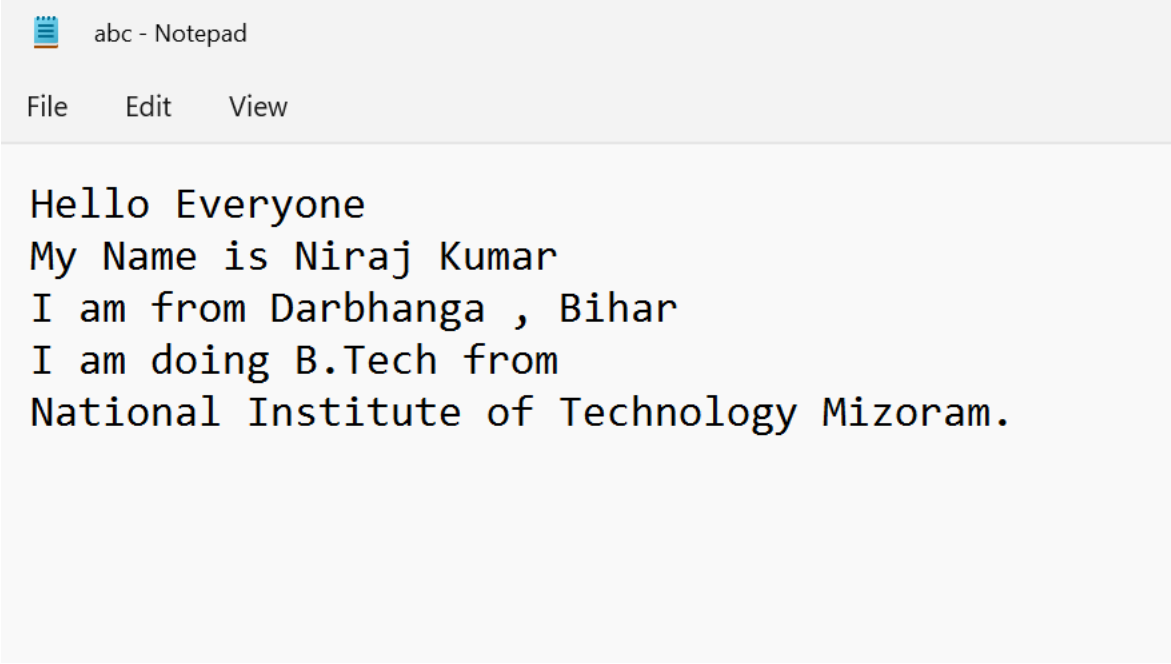
Program 2: To count the longest word in a text file.

[github link to question2]

```
/* Lex Program To count the longest word in a text file */



/* Definitions
  Declaration Section */
%{
#include<stdio.h>
#include<string.h>
#include<conio.h>
int longest=0;
char longword[60]; /* Global Variables */
%}



/* Rules Section
  Translation Rules */
%%
[a-zA-Z]+ {if(yyleng>longest){
            longest=yyleng;
            strcpy(longword,yytext);
              }
            }
```

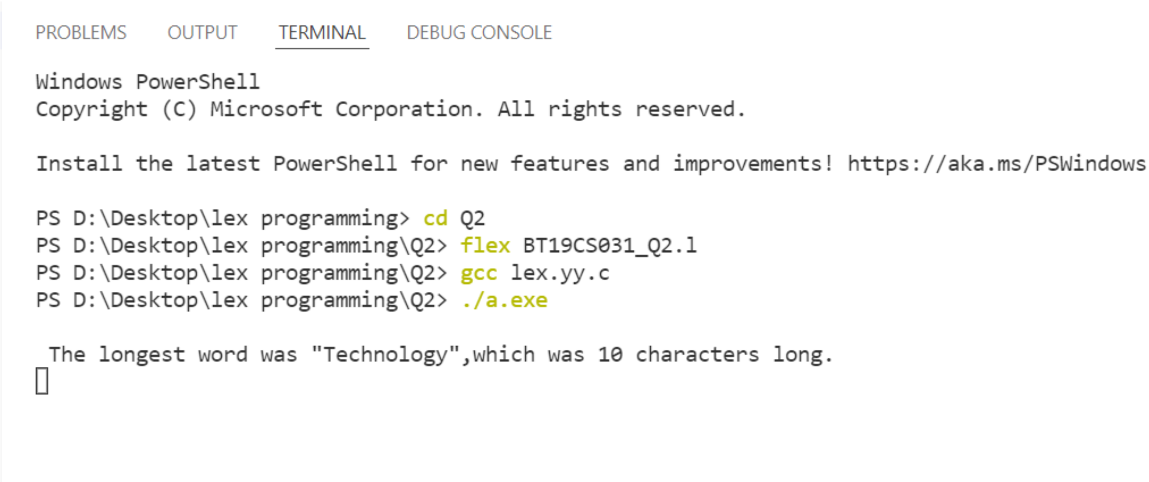
```
.
\n ;



%%
/* User Subroutines
  Auxiliary Procedure Section */

int yywrap()
{
return 1;
}

int main(void)
{
yyin=fopen("abc.txt","r");
yylex();
printf("\n The longest word was \"%s\",which was %d characters
long.\n"
,longword, longest);

getch();
return 0;
}
```

abc.txt file



```
Hello Everyone
My Name is Niraj Kumar
I am from Darbhanga , Bihar
I am doing B.Tech from
National Institute of Technology Mizoram.
```

output



```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS D:\Desktop\lex programming> cd Q2
PS D:\Desktop\lex programming\Q2> flex BT19CS031_Q2.l
PS D:\Desktop\lex programming\Q2> gcc lex.yy.c
PS D:\Desktop\lex programming\Q2> ./a.exe

 The longest word was "Technology",which was 10 characters long.
```

3. Program to recognize a valid arithmetic expression and recognize the identifiers and operators present.

[github link to question3]

```
/* Lex program to recognize valid arithmetic expression
                  and identify the identifiers and operators present*/

/* Definitions
   Declaration Section */
%{
#include <stdio.h>
#include<conio.h>
#include <string.h>
int operators_count = 0, operands_count = 0, valid = 1, top = -1, l = 0, j = 0;
char operands[10][10], operators[10][10], stack[100];  /* Global Variables */
%}


/* Rules Section
```

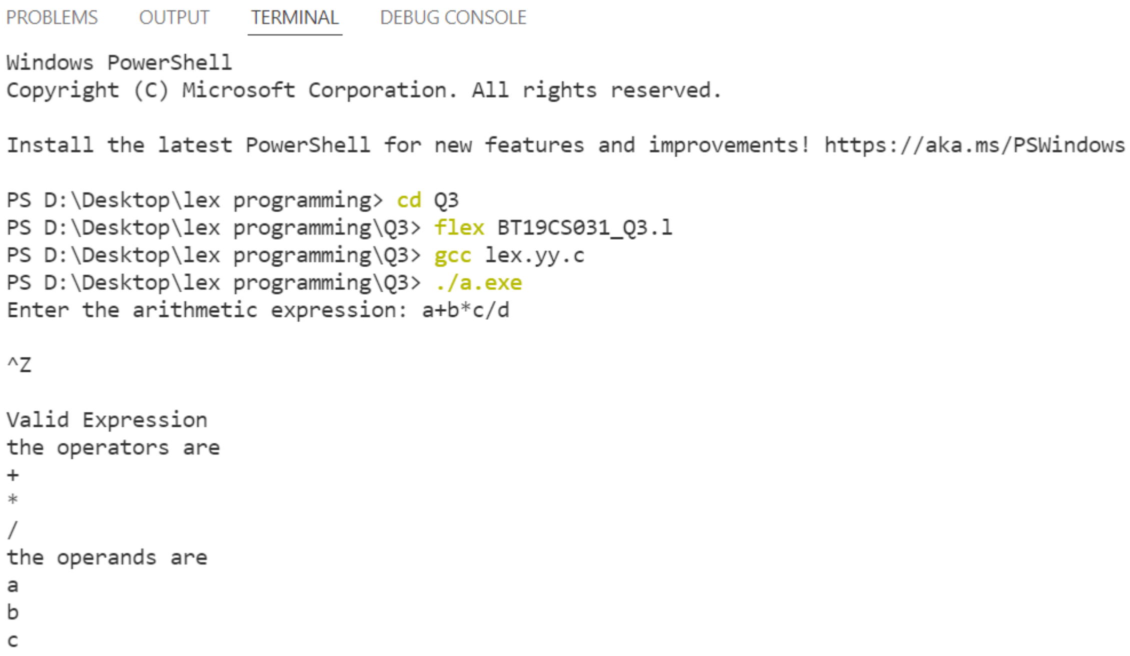
```
  Translation Rules */
%%
"(" {
        top++;
        stack[top] = '(';
}
"{" {
        top++;
        stack[top] = '{';
}
"[" {
        top++;
        stack[top] = '[';
}
")" {
        if (stack[top] != '(') {
                valid = 0;
        }
        else if(operands_count>0 && (operands_count-operators_count)!=1){
                valid=0;
        }
        else{
                top--;
        operands_count=1;
        operators_count=0;
    }
}
"}" {
    if (stack[top] != '{') {
        valid = 0;
    }
    else if(operands_count>0 && (operands_count-operators_count)!=1){
        valid=0;
    }
    else{
        top--;
        operands_count=1;
        operators_count=0;
    }
}
"]" {
    if (stack[top] != '[') {
        valid = 0;
    }
    else if(operands_count>0 && (operands_count-operators_count)!=1){
```

```
                valid=0;
        }
        else{
                top--;
                operands_count=1;
                operators_count=0;
        }

}
"+"|"-"|"*"|"/" {
        operators_count++;
        strcpy(operators[l], yytext);
        l++;
}
[0-9]+|[a-zA-Z][a-zA-Z0-9_]* {
        operands_count++;
        strcpy(operands[j], yytext);
        j++;
}


%%
/* User Subroutines
   Auxiliary Procedure Section */
```

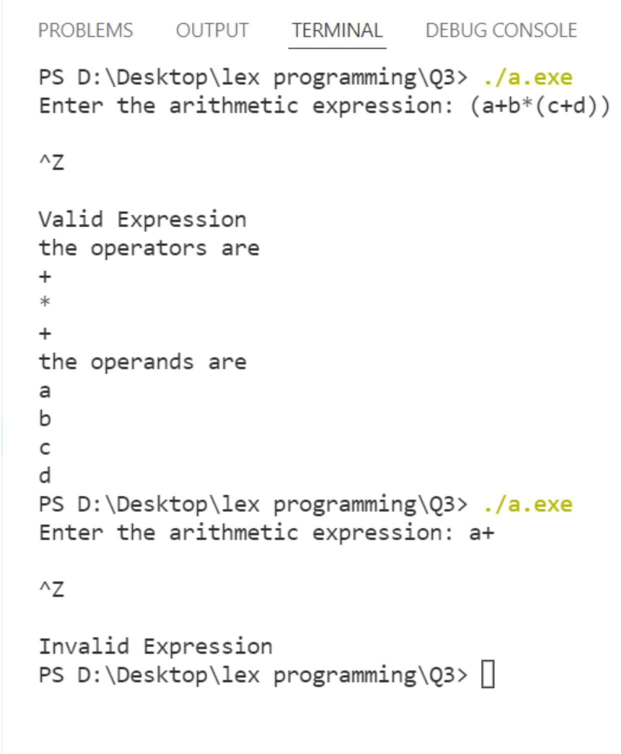
```
int yywrap()
{
    return 1;
}
int main()
{
    int k;
    printf("Enter the arithmetic expression: ");
    yylex();

    if (valid == 1 && top == -1 && (operands_count-operators_count)==1)
    {
        printf("\nValid Expression\n");
        printf("the operators are\n");
   for(k=0;k<l;k++)
    printf("%s \n",operators[k]);

        printf("the operands are\n");
   for(k=0;k<j;k++)
    printf("%s \n",operands[k]);
    }
    else
```

```
                printf("\nInvalid Expression\n");
    getch();
        return 0;
}
```

output



```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS D:\Desktop\lex programming> cd Q3
PS D:\Desktop\lex programming\Q3> flex BT19CS031_Q3.l
PS D:\Desktop\lex programming\Q3> gcc lex.yy.c
PS D:\Desktop\lex programming\Q3> ./a.exe
Enter the arithmetic expression: a+b*c/d

^Z

Valid Expression
the operators are
+
*
/
the operands are
a
b
c
```



```
PS D:\Desktop\lex programming\Q3> ./a.exe
Enter the arithmetic expression: (a+b*(c+d))

^Z

Valid Expression
the operators are
+
*
+
the operands are
a
b
c
d
PS D:\Desktop\lex programming\Q3> ./a.exe
Enter the arithmetic expression: a+

^Z

Invalid Expression
PS D:\Desktop\lex programming\Q3> 
```

----

4. Program to find total number of vowels and consonants in an input string.

[github link to question4]

/* Lex Program to find total number of

vowels and consonants in an input string */

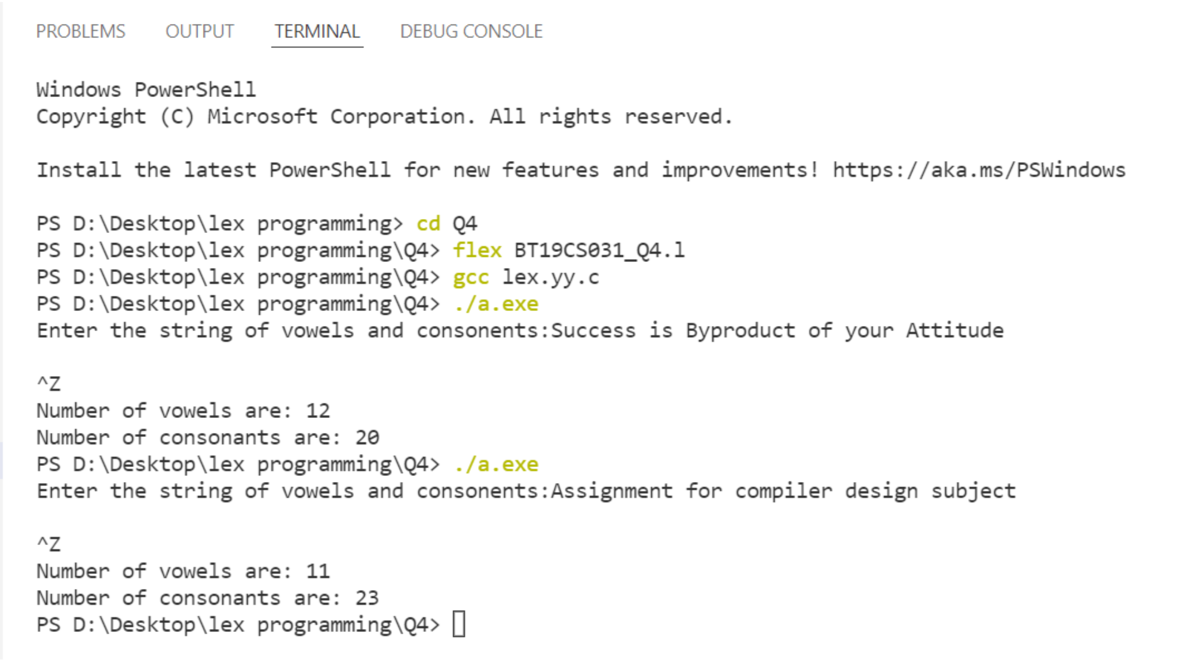
/* Definitions

Declaration Section */

```
%{
        #include<stdio.h>
        #include<conio.h>
        #include<string.h>
        int vow_count=0;
        int const_count =0; /* Global Variables */
%}


/* Rules Section
  Translation Rules */
%%
[aeiouAEIOU] {vow_count++;}
[a-zA-Z] {const_count++;}



%%
/* User Subroutines
  Auxiliary Procedure Section */

int yywrap()
{
        return 1;
}
```

```
int main()
{
        printf("Enter the string of vowels and consonents:");
        yylex();
        printf("Number of vowels are: %d\n", vow_count);
        printf("Number of consonants are: %d\n", const_count);
        getch();
        return 0;
}
```

output



```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS D:\Desktop\lex programming> cd Q4
PS D:\Desktop\lex programming\Q4> flex BT19CS031_Q4.l
PS D:\Desktop\lex programming\Q4> gcc lex.yy.c
PS D:\Desktop\lex programming\Q4> ./a.exe
Enter the string of vowels and consonents:Success is Byproduct of your Attitude

^Z
Number of vowels are: 12
Number of consonants are: 20
PS D:\Desktop\lex programming\Q4> ./a.exe
Enter the string of vowels and consonents:Assignment for compiler design subject

^Z
Number of vowels are: 11
Number of consonants are: 23
PS D:\Desktop\lex programming\Q4>
```

5. Program to get the number of characters, blanks and words in a text

[github link to question5]

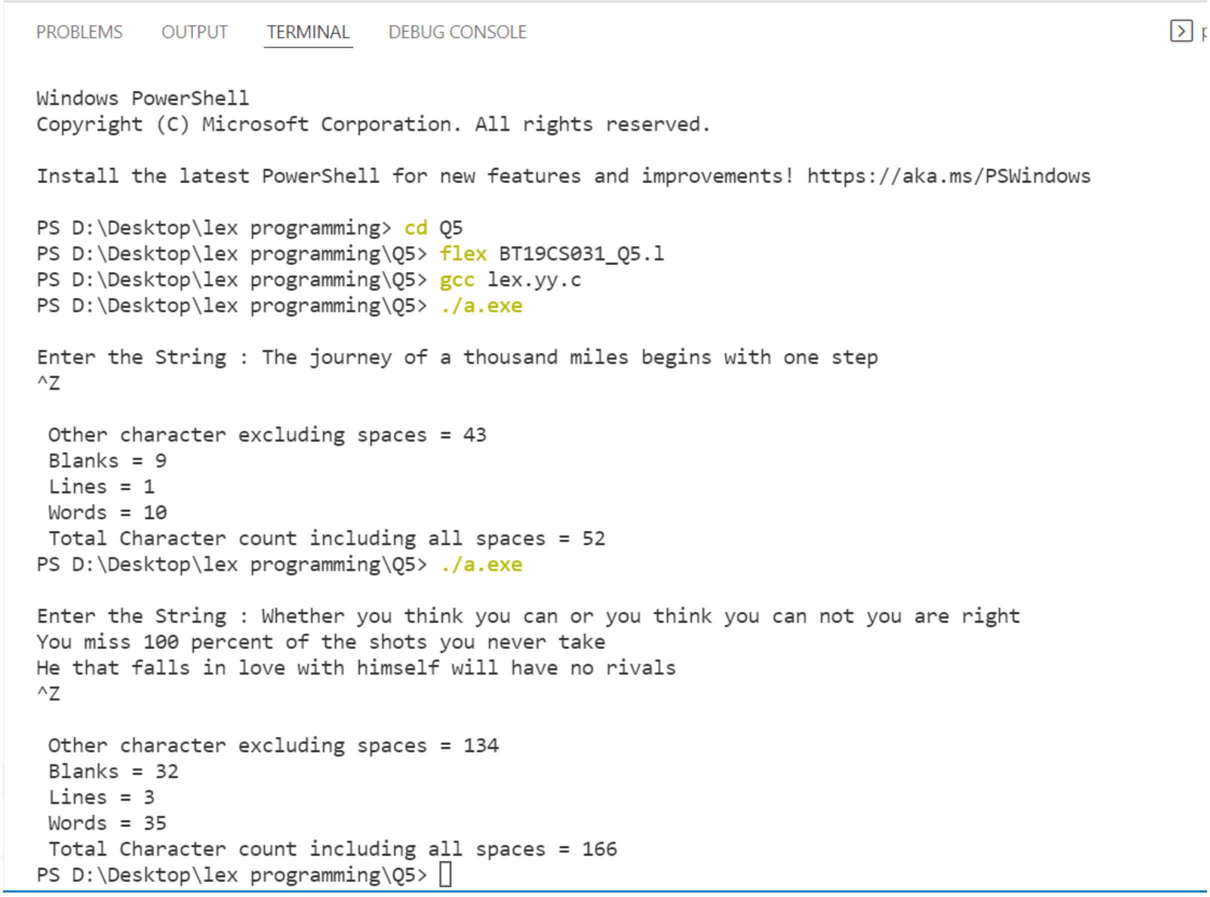
```
/*Lex Program to get the number of characters,
  blanks and words in a text */



/* Definitions
   Declaration Section */
%{
#include<stdio.h>
#include<string.h>
#include<conio.h>
int ch=0, bl=0, ln=0, wr=0; /* global variables */
%}



/* Rules Section
   Translation Rules */
%%
[\n] {ln++;wr++;}
```

```
[\t] {bl++;wr++;}
[" "] {bl++;wr++;}
[^\n\t] {ch++;}


%%

/* User Subroutines
   Auxiliary Procedure Section */

int yywrap()
{
    return 1;
}
int main()
{
printf("\nEnter the String : ");
yylex();
printf("\n Other character excluding spaces = %d ",ch);
printf("\n Blanks = %d",bl);
printf("\n Lines = %d",ln);
printf("\n Words = %d",wr);
printf("\n Total Character count including all spaces = %d",ch+bl);
getch();
```

return 0;

}

Output



```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS D:\Desktop\lex programming> cd Q5
PS D:\Desktop\lex programming\Q5> flex BT19CS031_Q5.l
PS D:\Desktop\lex programming\Q5> gcc lex.yy.c
PS D:\Desktop\lex programming\Q5> ./a.exe

Enter the String : The journey of a thousand miles begins with one step
^Z

 Other character excluding spaces = 43
 Blanks = 9
 Lines = 1
 Words = 10
 Total Character count including all spaces = 52
PS D:\Desktop\lex programming\Q5> ./a.exe

Enter the String : Whether you think you can or you think you can not you are right
You miss 100 percent of the shots you never take
He that falls in love with himself will have no rivals
^Z

 Other character excluding spaces = 134
 Blanks = 32
 Lines = 3
 Words = 35
 Total Character count including all spaces = 166
PS D:\Desktop\lex programming\Q5> 
```