Experiment 5

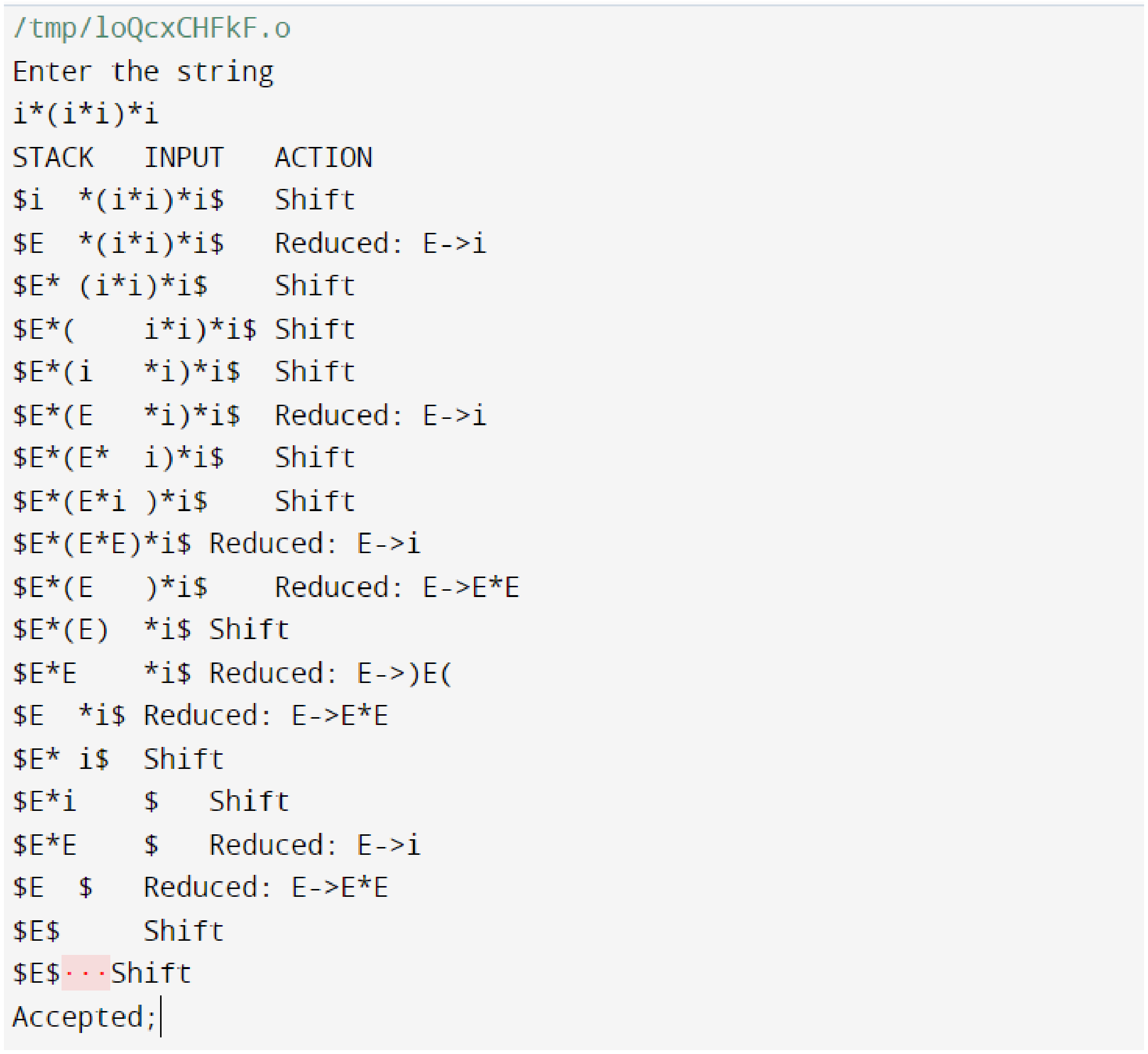
Operator Precedence Parser

Code:

```
#include<stdio.h>
#include<string.h>

char *input;
int i=0;
char
lasthandle[6],stack[50],handles[][5]={")E(",
"E*E","E+E","i","E^E"};
//(E) becomes )E( when pushed to stack

int top=0,l;
char prec[9][9]={

                    /*input*/

        /*stack    +    -   *   /   ^   i   (   )   $  */

        /*  + */  '>', '>','<','<','<','<','<','>','>',

        /*  - */  '>', '>','<','<','<','<','<','>','>',

        /*  * */  '>', '>','>','>','<','<','<','>','>',

        /*  / */  '>', '>','>','>','<','<','<','>','>',

        /*  ^ */  '>', '>','>','>','<','<','<','>','>',

        /*  i */  '>', '>','>','>','>','e','e','>','>',

        /*  ( */  '<', '<','<','<','<','<','<','>','e',

        /*  ) */  '>', '>','>','>','>','e','e','>','>',

        /*  $ */  '<', '<','<','<','<','<','<','<','>',

              };

int getindex(char c)
{
switch(c)
   {
   case '+':return 0;
   case '-':return 1;
   case '*':return 2;
   case '/':return 3;
   case '^':return 4;
   case 'i':return 5;
   case '(':return 6;
   case ')':return 7;
   case '$':return 8;
   }
}


int shift()
{
stack[++top]=*(input+i++);
stack[top+1]='\0';
}


int reduce()
{
int i,len,found,t;
for(i=0;i<5;i++)//selecting handles
   {
   len=strlen(handles[i]);

if(stack[top]==handles[i][0]&&top+1>=len)
      {
        found=1;
        for(t=0;t<len;t++)
           {
           if(stack[top-t]!=handles[i][t])
              {
              found=0;
              break;
              }
           }
        if(found==1)
           {
           stack[top-t+1]='E';
           top=top-t+1;
           strcpy(lasthandle,handles[i]);
           stack[top+1]='\0';
           return 1;//successful reduction
           }
        }
   }
return 0;
}


void dispstack()
{
int j;
for(j=0;j<=top;j++)
   printf("%c",stack[j]);
}


void dispinput()
{
int j;
for(j=i;j<l;j++)
   printf("%c",*(input+j));
}
```

```
void main()
{
int j;

input=(char*)malloc(50*sizeof(char));
printf("\nEnter the string\n");
scanf("%s",input);
input=strcat(input,"$");
l=strlen(input);
strcpy(stack,"$");
printf("\nSTACK\tINPUT\tACTION");
while(i<=l)
        {
        shift();
        printf("\n");
        dispstack();
        printf("\t");
        dispinput();
        printf("\tShift");
        if(prec[getindex(stack[top])][getinde
x(input[i])]=='>')
                {
                while(reduce())
                        {
                        printf("\n");
                        dispstack();
                        printf("\t");
                        dispinput();
                        printf("\tReduced: E-
>%s",lasthandle);
                        }
                }
        }

if(strcmp(stack,"$E$")==0)
   printf("\nAccepted;");
else
   printf("\nNot Accepted;");
}
```

Output:



```
/tmp/loQcxCHFkF.o
Enter the string
i*(i*i)*i
STACK   INPUT   ACTION
$i  *(i*i)*i$   Shift
$E  *(i*i)*i$   Reduced: E->i
$E* (i*i)*i$    Shift
$E*(    i*i)*i$ Shift
$E*(i   *i)*i$  Shift
$E*(E   *i)*i$  Reduced: E->i
$E*(E*  i)*i$   Shift
$E*(E*i )*i$    Shift
$E*(E*E)*i$ Reduced: E->i
$E*(E   )*i$    Reduced: E->E*E
$E*(E)  *i$ Shift
$E*E    *i$ Reduced: E->)E(
$E  *i$ Reduced: E->E*E
$E* i$  Shift
$E*i    $   Shift
$E*E    $   Reduced: E->i
$E  $   Reduced: E->E*E
$E$     Shift
$E$   Shift
Accepted;
```