LABORATORY WORK №3

PROGRAMMING iterative CYCLE ALGORITHMS

Objective: to study methods of organizing iteration cycles.

The task

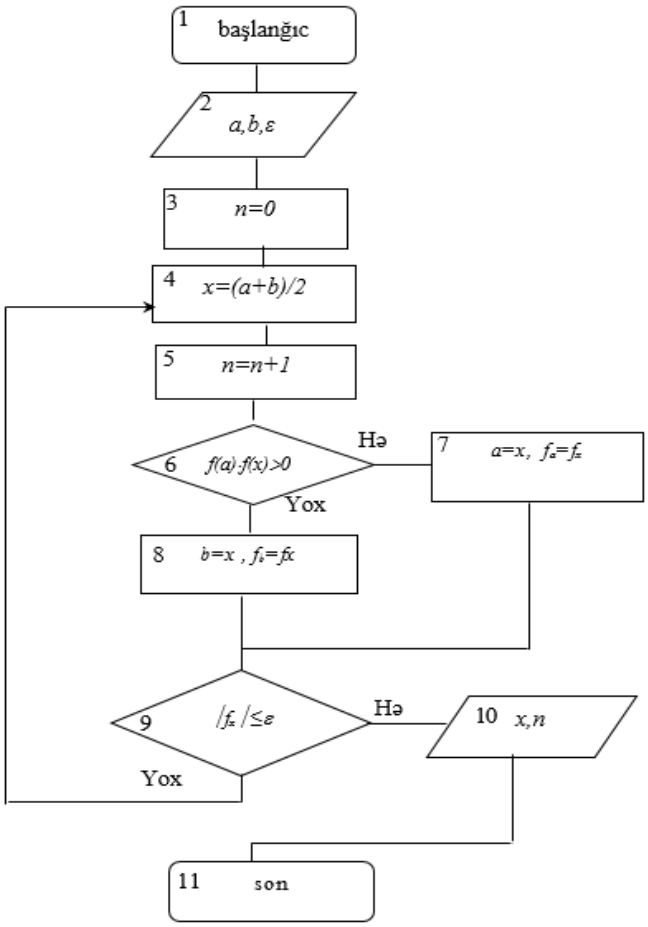
Using the half-division method, find the solution of the equation. Tasks are given in the table

Variant	Equation	Interval	error
1	$e^{x}-e^{-x}-2=0$	[0;1]	10^{-3}
2	$3\sin 4x+0.35x-3.8=0$	[2;3]	10^{-3}
3	$x-2+\sin(1/x)=0$	[1.2;2]	10^{-4}
4	$1-x+\sin x-\ln(1+x)=0$	[0;1.5]	10^{-5}
5	$x^{2}-\ln(1-x)-3=0$	[8;3]	10^{-4}
6	$x-3+\ln 3=0$	[0;0.85]	$0.5*10^{-2}$
7	$\ln x-x+1.8=0$	[2;3]	$0.5*10^{-4}$
8	$0,1x^{2}-x\ln x=0$	[1;2]	$0.5*10^{-4}$
9	$x+\cos(x^{0,32}+2)=0$	[0.5;1]	10^{-2}
10	$\sqrt{1-0.4x}-\arcsin x=0$	[0;1]	10^{-2}
11	$x^{2}+10x-10=0$	[0;1]	10^{-5}
12	$3x-4\ln x-5=0$	[2;4]	$0.5*10^{-2}$
13	$0,4+\operatorname{arctg}x-x=0$	[1;2]	10^{-2}
14	$\arccos x-41-0.3x^{2}=0$	[0;1]	$0.5*10^{-2}$
15	$2x-31nx-3=0$	[0.5;1]	10^{-3}

Example

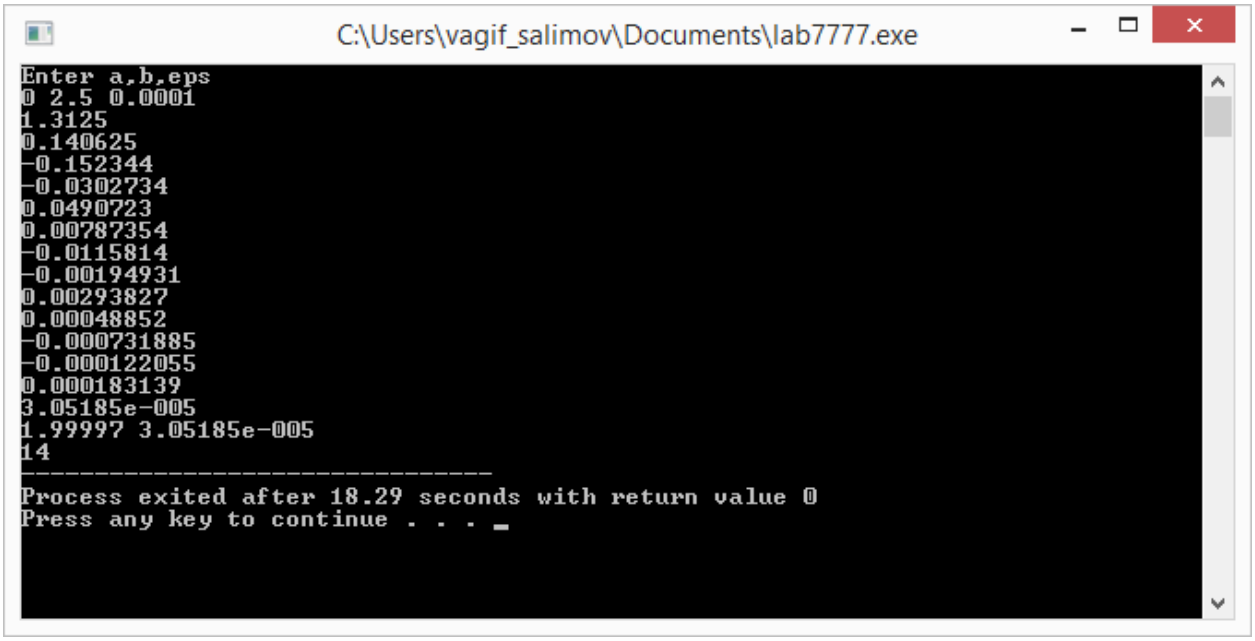
Using the half-division method, find the solution of the equation x*x -5*x+6= 0 with an error **eps** = 0.01. interval [0.- 2.5]

In block 2, the initial root location intervals and the absolute error value are input. In block 3, the initial value of the iteration counter is specified. In blocks 4-8, new root approximations are calculated, in block 9, the achievement of the required accuracy is checked. Block 10 outputs the results



Example Program.

```
#include <iostream>
#include <math.h>
using namespace std;
int main ( )
{
float a,b,x,fa,fb,fx,eps;
int i,n;
cout<<"Enter a,b,eps"<<endl;
cin>>a>>b>>eps;
n=0;
do   {
x=(a+b)/2;
fa=a*a-5*a+6;
fb=b*b -5*b+6;
fx=x*x-5*x+6;
if   (fa*fx>0) {
a=x;
fa=fx;}
 else
{b=x;
fb=fx;}
n=n+1;
cout<<fx<<endl;
   }
while( fabs(fx)>eps);
cout<<x<<" "<<fx<<endl;
cout<<n;
          return 0;
}
```


C:\Users\vagif_salimov\Documents\lab7777.exe
Enter a,b,eps
0 2.5 0.0001
1.3125
0.140625
-0.152344
-0.0302734
0.0490723
0.00787354
-0.0115814
-0.00194931
0.00293827
0.00048852
-0.000731885
-0.000122055
0.000183139
3.05185e-005
1.99997 3.05185e-005
14

Process exited after 18.29 seconds with return value 0
Press any key to continue . . .