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Kelas : **A2 - Metode Numerik**

Soal

Buatlah program penyelesaian untuk menghitung akar-akar persamaan menggunakan **Metode Setengah Interval (Bisection Method)** dalam Bahasa c++

Jawab

1. Sourcecode

```
#include <iostream>
#include <stdio.h>
#include <conio.h>
#include <math.h>
#include <cmath>
#include <iomanip>
using namespace std;
float f(float x);
int main()
{
float x1,x2,xt,error,tol;
int i=1;
```

```
//1. Menentukan input sembarang titik x1 dan x2 untuk kemudian dihitung nilai fungsinya
```

```
cout<<"f(x) =x^3+x^2-3x-3"<<endl;
cout<<"Masukkan titik x1: "; cin>>x1;
cout<<"Masukkan titik x2: ";cin>>x2;
```

```
//2.Cek apakah f(x1)*f(x2)>0
```

```

if (f(x1)*f(x2)>0){
do{
    cout<<"Masukkan lagi x1 dan x2 sehingga f(x1)*f(x2)<0 (salah satu nilai x1 atau x2
    harus bernilai negatif)"<<endl;

    cout<<"Masukkan titik x1: "; cin>>x1;

    cout<<"Masukkan titik x2: ";cin>>x2;

    }
while (f(x1)*f(x2)>0);
}

//3. Menentukan nilai epsilon
cout<<"Masukkan nilai batas kesalahan (epsilon): ";cin>>tol;
{
    cout<<"\n\nHasil perhitungan akar-akar persamaan tersebut adalah: \n"<<endl;
    cout<<setw(5)<<"i"<<setw(15)<<"x1"<<setw(20)<<"x2"<<setw(20)<<"xt"<<setw(20)<
    <"f(x1)";
    cout<<setw(20)<<"f(x2)"<<setw(20)<<"f(xt)"<<setw(20)<<"error"<<endl;

// 4. Menghitung nilai xt dan nilai fungsi f(xt)
do
{
    xt=(x1+x2)/2;
    error= abs(x2-x1);

    cout<<setw(5)<<"i"<<setw(15)<<"x1"<<setw(20)<<"x2"<<setw(20)<<"xt"<<setw(20)<<"f(x1)"<
    <setw(20);
    cout<<"f(x2)"<<setw(20)<<"f(xt)"<<setw(20)<<"error"<<endl;
    if(f(x1)*f(xt)<0)
    { x2=xt; }
    else
    { x1=xt;
    }
}

```

```

i++;

}

while( (error > tol) && (i < 40));

cout<<"\n\nApprox. root = "<<xt<<endl;

cout<<"Banyaknya iterasi : "<<i-40;

}

getch();

return 0;

}

float f(float x)

{

return (pow(x,3)+(x,2)-(3*x)-3);

}

```

2. Hasil

```

C:\Users\ACER\Downloads\metode_numerik01.exe
f(x) =x^3+x^2-3x-3
Masukkan titik x1: -77
Masukkan titik x2: 45
Masukkan nilai batas kesalahan (epsilon): 0.0001

Hasil perhitungan akar-akar persamaan tersebut adalah:



| i  | x1       | x2       | xt       | f(x1)         | f(x2)       | f(xt)         | error        |
|----|----------|----------|----------|---------------|-------------|---------------|--------------|
| 1  | -77      | 45       | -16      | -456303       | 90989       | -4049         | 122          |
| 2  | -16      | 45       | 14.5     | -4049         | 90989       | 3004.12       | 61           |
| 3  | -16      | 14.5     | -0.75    | -4049         | 3004.12     | 0.828125      | 30.5         |
| 4  | -16      | -0.75    | -8.375   | -4049         | 0.828125    | -563.303      | 15.25        |
| 5  | -8.375   | -0.75    | -4.5625  | -563.303      | 0.828125    | -82.2874      | 7.625        |
| 6  | -4.5625  | -0.75    | -2.65625 | -82.2874      | 0.828125    | -11.7729      | 3.8125       |
| 7  | -2.65625 | -0.75    | -1.70312 | -11.7729      | 0.828125    | -0.830769     | 1.90625      |
| 8  | -1.70312 | -0.75    | -1.22656 | -0.830769     | 0.828125    | 0.834379      | 0.953125     |
| 9  | -1.70312 | -1.22656 | -1.46484 | -0.830769     | 0.834379    | 0.251318      | 0.476562     |
| 10 | -1.70312 | -1.46484 | -1.58398 | -0.830769     | 0.251318    | -0.222274     | 0.238281     |
| 11 | -1.58398 | -1.46484 | -1.52441 | -0.222274     | 0.251318    | 0.0307505     | 0.119141     |
| 12 | -1.58398 | -1.52441 | -1.5542  | -0.222274     | 0.0307505   | -0.0916252    | 0.0595703    |
| 13 | -1.5542  | -1.52441 | -1.53931 | -0.0916252    | 0.0307505   | -0.029413     | 0.0297852    |
| 14 | -1.53931 | -1.52441 | -1.53186 | -0.029413     | 0.0307505   | 0.000923395   | 0.0148926    |
| 15 | -1.53931 | -1.53186 | -1.53558 | -0.029413     | 0.000923395 | -0.0141811    | 0.00744629   |
| 16 | -1.53558 | -1.53186 | -1.53372 | -0.0141811    | 0.000923395 | -0.00661302   | 0.00372314   |
| 17 | -1.53372 | -1.53186 | -1.53279 | -0.00661302   | 0.000923395 | -0.00284076   | 0.00186157   |
| 18 | -1.53279 | -1.53186 | -1.53233 | -0.00284076   | 0.000923395 | -0.000957727  | 0.000930786  |
| 19 | -1.53233 | -1.53186 | -1.53209 | -0.000957727  | 0.000923395 | -1.69277e-005 | 0.000465393  |
| 20 | -1.53209 | -1.53186 | -1.53198 | -1.69277e-005 | 0.000923395 | 0.000453234   | 0.000232697  |
| 21 | -1.53209 | -1.53198 | -1.53203 | -1.69277e-005 | 0.000453234 | 0.000218391   | 0.000116348  |
| 22 | -1.53209 | -1.53203 | -1.53206 | -1.69277e-005 | 0.000218391 | 0.000100851   | 5.81741e-005 |



Approx. root = -1.53206
Banyaknya iterasi : -17_

```