3. Students are required to write both the programs (IVT and Bisection) and implement it on the following examples.

(i) Use bisection method in computing of sqrt 29 with ϵ = 0.001, *N* = 10, *h* = 1.

**Solution:**

clear all

clc

syms x

f=@(x) x^2-29

tol=0.001; %tolerance

h=1;

n1=-10 %-N we cand define a variable with - sign

n2=10 %N

for i=n1:h:n2

if(f(i)\*f(i+h)<0)

a=i;

b=i+h;

% break; %if u use this also you are corect

end

end

disp(a)

disp(b)

%c=(a+b)/2;

while(abs(a-b)>tol) %until error becomes less (amount we can tolerate)

c=(a+b)/2;

if(f(a)\*f(c)<0)

b=c;

else

a=c;

end

end

disp(c)

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(ii) Determine the number of iterations necessary to solve *f*(*x*) = *x*3 + 4*x*2 – 10 = 0 with accuracy 10-3 using *a* = 1 and *b* = 2 and hence find the root with desired accuracy.

**Solution:**

clear all

clc

syms x

f=@(x) x^3+4\*x^2-10

tol=0.001; %accuracy here

% h=1;

% n1=-10 %-N we cand define a variable with - sign

% n2=10 %N

% for i=n1:h:n2

% if(f(i)\*f(i+h)<0)

% a=i;

% b=i+h;

% % break; %if u use this also you are corect

% end

% end

% disp(a)

% disp(b)

% %c=(a+b)/2;

a=1;

b=2;

count=0;

while(abs(a-b)>tol) %until error becomes less (amount we can tolerate)

c=(a+b)/2;

if(f(a)\*f(c)<0)

b=c;

else

a=c;

end

count=count+1; %stores no of iterations

end

disp(c) %root

disp(count) %no of iterations

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4. Thermistors are temperature-measuring devices based on the principle that the thermistor material exhibits a change in electrical resistance with a change in temperature.

By measuring the resistance of the thermistor material, one can then determine the temperature. For a 10K3A Betatherm thermistor, the relationship between the resistance *R* of the thermistor and the temperature is given by 1𝑇 = 1.129241 × 10−3 + 2.341077 × 10−4 ln 𝑅 + 8.775468 × 10−8 ln(𝑅) 3

where *T* is in Kelvin and *R* is in ohms. Use the bisection method to find the resistance R at 18.990C.

**Solution:**

syms r

f=@(r) 8.775468\*10^(-8)\*(log(r)^3) + 2.341077\*10^(-4)\*log(r) + (1.129241\*10^(-3) - 1/(292.14))

a=11000;

b=14000

count=0;

while(abs(a-b)>tol) %until error becomes less (amount we can tolerate)

c=(a+b)/2;

if(f(a)\*f(c)<0)

b=c;

else

a=c;

end

count=count+1; %stores no of iterations

end

disp(c) %root

disp(count) %no of iterations

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