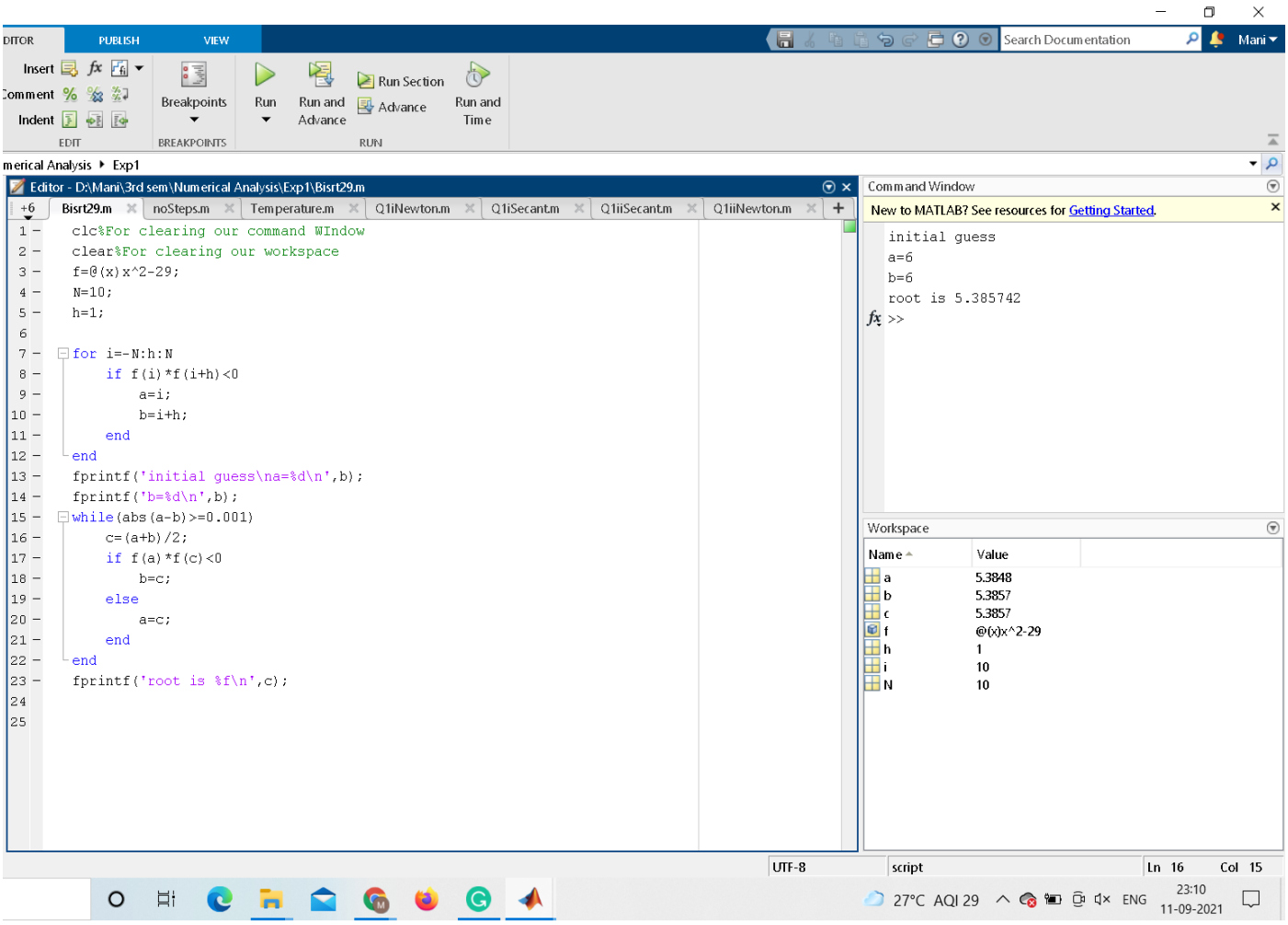
Name: Mani Garg Roll No.: 102003470 Batch: 2COE-19

EXPERIMENT-1

Q1

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 $\epsilon = 0.001$, $N = 10$, $h = 1$.
   (ii) Determine the number of iterations necessary to solve $f(x) = x^3 + 4x^2 - 10 = 0$ with accuracy 10^{-3} using $a = 1$ and $b = 2$ and hence find the root with desired accuracy.

Ans1(i)



Name: Mani Garg Roll No.: 102003470 Batch: 2COE-19

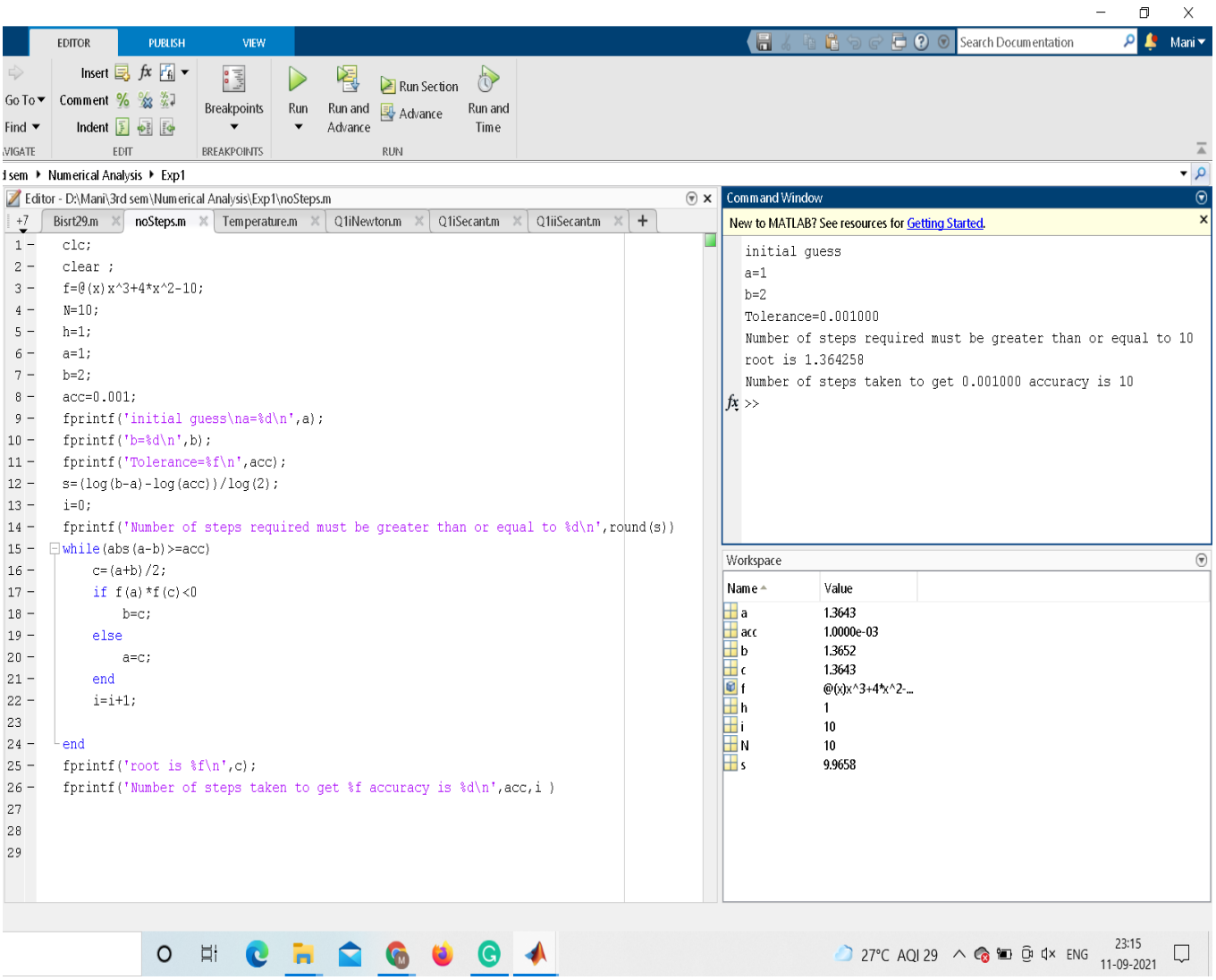
CODE:

```
clc%For clearing our command Window
clear%For clearing our workspace
f=@(x)x^2-29;
N=10;
h=1;

for i=-N:h:N
   if f(i)*f(i+h)<0
      a=i;
      b=i+h;
   end
end
fprintf('initial guess\na=%d\n',b);
fprintf('b=%d\n',b);
while(abs(a-b)>=0.001)
   c=(a+b)/2;
   if f(a)*f(c)<0
      b=c;
   else
      a=c;
   end
end
fprintf('root is %f\n',c);
```

Name: Mani Garg Roll No.: 102003470 Batch: 2COE-19

Ans1(ii)



Name: Mani Garg Roll No.: 102003470 Batch: 2COE-19

CODE:

```
clc;
clear ;
f=@(x)x^3+4*x^2-10;
N=10;
h=1;
a=1;
b=2;
acc=0.001;
fprintf('initial guess\na=%d\n',a);
fprintf('b=%d\n',b);
fprintf('Tolerance=%f\n',acc);
s=(log(b-a)-log(acc))/log(2);
i=0;
fprintf('Number of steps required must be greater than or equal to %d\n',round(s))
while(abs(a-b)>=acc)
   c=(a+b)/2;
   if f(a)*f(c)<0
      b=c;
   else
      a=c;
   end
   i=i+1;
end
fprintf('root is %f\n',c);
fprintf('Number of steps taken to get %f accuracy is %d\n',acc,i )
```

Name: Mani Garg Roll No.: 102003470 Batch: 2COE-19

Q2

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.

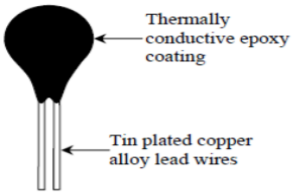


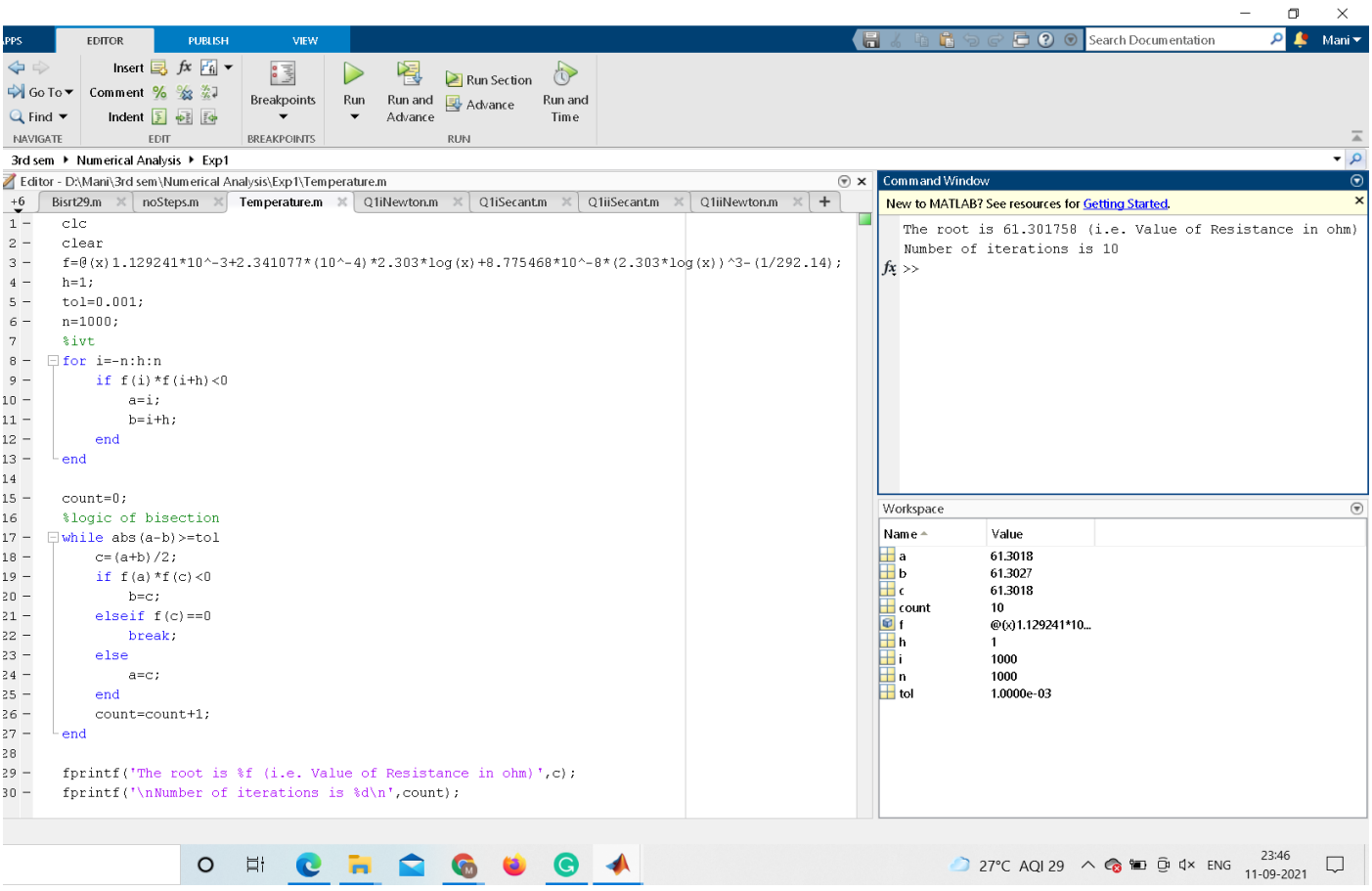
Figure 1 A ty `cal thermistor.

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

$$\frac{1}{T} = 1.129241 \times 10^{-3} + 2.341077 \times 10^{-4} \ln(R) + 8.775468 \times 10^{-8}\{\ln(R)\}^3$$

where T is in Kelvin and R is in ohms. Use the bisection method to find the resistance R at 18.99^0C.

Ans2



Name: Mani Garg Roll No.: 102003470 Batch: 2COE-19

CODE:

```
clc
clear
f=@(x)1.129241*10^-3+2.341077*(10^-4)*2.303*log(x)+8.775468*10^-8*(2.303*log(x))^3-(1/292.14);
h=1;
tol=0.001;
n=1000;
%ivt
for i=-n:h:n
   if f(i)*f(i+h)<0
      a=i;
      b=i+h;
   end
end
count=0;
%logic of bisection
while abs(a-b)>=tol
   c=(a+b)/2;
   if f(a)*f(c)<0
      b=c;
   elseif f(c)==0
      break;
   else
      a=c;
   end
   count=count+1;
end

fprintf('The root is %f (i.e. Value of Resistance in ohm)',c);
fprintf('\nNumber of iterations is %d\n',count);
```