

PRACTICAL-3

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ROLL

Secant

Method

Ques - 1

```

In[269]:= x0 = Input["Enter first guess: "];
x1 = Input["Enter the second guess: "];
Nmax = Input["Enter maximum number of iteration: "];
eps = Input["enter the value of covergance parameter :"];
Print["x0=", x0];
Print["x1=", x1];
Print["Nmax=", Nmax];
Print["epsilon=", eps];
f[x_] := Cos[x];
Print["f[x] :=", f[x]];
For [i = 1, i ≤ Nmax, i++,
  x2 = N[x1 - (f[x] /. x → x1) *
    (x1 - x0) / ((f[x] /. x → x1) - (f[x] /. x → x0))];
  If[Abs[x1 - x2] < eps, Return[x2], x0 = x1; x1 = x2];
  Print[i, "th number of iteration the root is : ", x2];
  Print["estimated error is :", Abs[x1 - x0]]];
Print["Root is :", x2];
Print["estimated error is: ", Abs[x2 - x1]];
Plot[f[x], {x, -1, 3}]

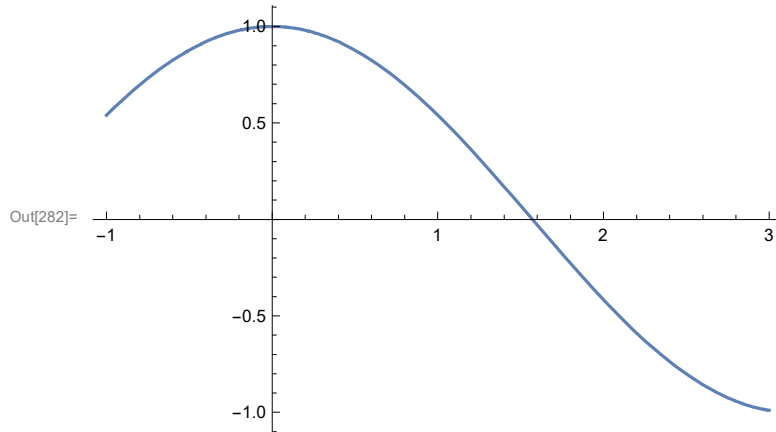
x0=2
x1=4
Nmax=6
epsilon=0.0001
f[x] :=Cos[x]
1th number of iteration the root is : -1.50444
estimated error is :5.50444
2th number of iteration the root is : -0.997495
estimated error is :0.506947
3th number of iteration the root is : -1.57504
estimated error is :0.577549
4th number of iteration the root is : -1.57056
estimated error is :0.00448691
5th number of iteration the root is : -1.5708
estimated error is :0.000239991

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Out[279]= Return [ -1.5708 ]

Root is :-1.5708

estimated error is:  $6.8066 \times 10^{-10}$

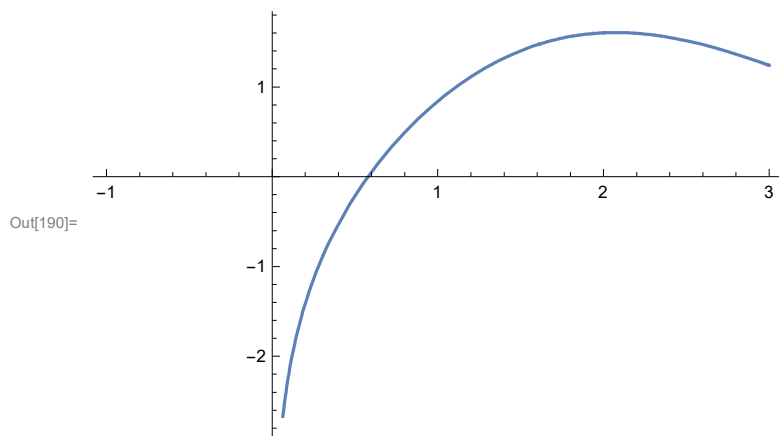


```
In[177]:= x0 = Input["Enter First Guess: "];
x1 = Input["Enter Second Guess :"];
Nmax = Input["Enter Maximum Nuber of Iterations :"];
eps = Input["Enter The Value of Convergenmce parameter :"];
Print["x0= ", x0];
Print["x1= ", x1];
Print["Nmax= ", Nmax];
Print["epsilon= ", eps];
f[x_] := Sin[x] + Log[x];
Print["f(x) :=", f[x]];
For[i = 1, i ≤ Nmax, i++,
  x2 = N[x1 - (f[x] /. x → x1) * (x1 - x0) / ((f[x] /. x → x1) - (f[x] /. x → x0))];
  If[Abs[x1 - x2] < eps, Return[x2], x0 = x1; x1 = x2];
  Print[i, "th number iterations the root is:", x2];
  Print["estimated error is: ", Abs[x1 - x0]]];
Print["root is: ", x2];
Print["estimated error is :", Abs[x2 - x1]];
Plot[f[x], {x, -1, 3}]
```

```

x0= 2
x1= 4
Nmax= 6
epsilon= 0.00001
f(x):=Log[x] + Sin[x]
1th number iterations the root is:5.29398
estimated error is: 1.29398
2th number iterations the root is:-0.042628
estimated error is: 5.33661
3th number iterations the root is:4.60948 - 0.533762 i
estimated error is: 4.68262
4th number iterations the root is:4.26271 - 0.709023 i
estimated error is: 0.388537
5th number iterations the root is:4.63056 - 1.18617 i
estimated error is: 0.602482
6th number iterations the root is:4.474 - 0.995884 i
estimated error is: 0.246415
root is: 4.474 - 0.995884 i
estimated error is :0.

```



In[283]:= Ques - 3

```

x0 = Input["Enter First Guess: "];
x1 = Input["Enter Second Guess :"];
Nmax = Input["Enter Maximum Nuber of Iterations :"];
eps = Input["Enter The Value of Convergenmce parameter :"];
Print["x0= ", x0];
Print["x1= ", x1];
Print["Nmax= ", Nmax];
Print["epsilon= ", eps];
f[x_] := x^3 - 5 x + 1;
Print["f(x) :=", f[x]];
For[i = 1, i ≤ Nmax, i++,
  x2 = N[x1 - (f[x] /. x → x1) * (x1 - x0) / ((f[x] /. x → x1) - (f[x] /. x → x0))];
  If[Abs[x1 - x2] < eps, Return[x2], x0 = x1; x1 = x2];
  Print[i, "th number iterations the root is:", x2];
  Print["estimated error is: ", Abs[x1 - x0]]];
Print["root is: ", x2];
Print["estimated error is :", Abs[x2 - x1]];
Plot[f[x], {x, -1, 3}]

```

Out[283]= - 3 + Ques

```

x0= 2
x1= 4
Nmax= 6
epsilon= 0.0001
f(x) := 1 - 5 x + x^3
1th number iterations the root is: 2.04348
estimated error is: 1.95652
2th number iterations the root is: 2.07278
estimated error is: 0.0293035
3th number iterations the root is: 2.13225
estimated error is: 0.0594661
4th number iterations the root is: 2.12826
estimated error is: 0.00399203
5th number iterations the root is: 2.12842
estimated error is: 0.000162821

```

Out[294]= Return[2.12842]

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root is: 2.12842
estimated error is : 4.63748 × 10-7

```

