# Practical

# 2(a) --> Secant Method

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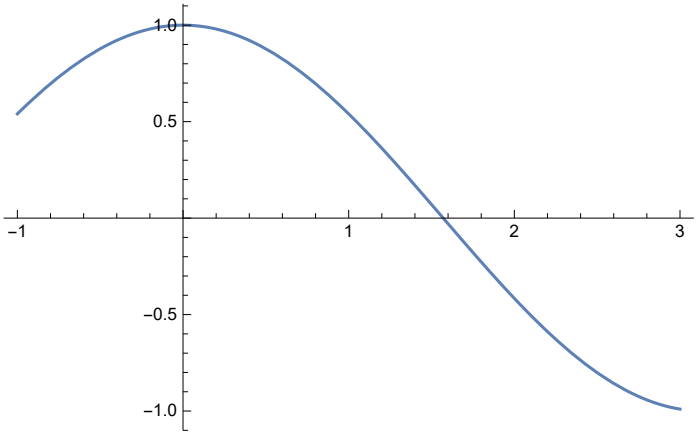
```
x0 = Input["Enter first guess: "];
x1 = Input ["Enter scond guess: "];
Nmax = Input["Enter maximum of iterations : " ];
eps = Input["Enter the value of covergence parameter: "];
Print["x0=", x0];
Print["x1=", x1];
Print["Nmax=", Nmax];
Print["epsilon=", eps];
f[x_] := Cos[x];
Print["f[x]:=", f[x]]
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["In", i, "th number of 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=1
x1=2
Nmax=20
epsilon=1/1000000
f[x]:=Cos[x]
In1th number of iterations the root is :1.5649
estimated error is: 0.435096
In2th number of iterations the root is :1.57098
estimated error is: 0.0060742
In3th number of iterations the root is :1.5708
estimated error is: 0.000182249
Return[1.5708]
root is : 1.5708
Estimated error is :1.02185×10^-9
```



```
x0 = Input["Enter first guess: "];
x1 = Input ["Enter scond guess: "];
Nmax = Input["Enter maximum of iterations : " ];
eps = Input["Enter the value of covergence 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["In", i, "th number of 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=1

x1=2

Nmax=20

epsilon= $\frac{1}{1\,000\,000}$

f[x]:=1 − 5 x + $x^3$

In1th number of iterations the root is :2.5

estimated error is: 0.5

In2th number of iterations the root is :2.09756

estimated error is: 0.402439

In3th number of iterations the root is :2.12134

estimated error is: 0.0237786

In4th number of iterations the root is :2.12859

estimated error is: 0.0072456

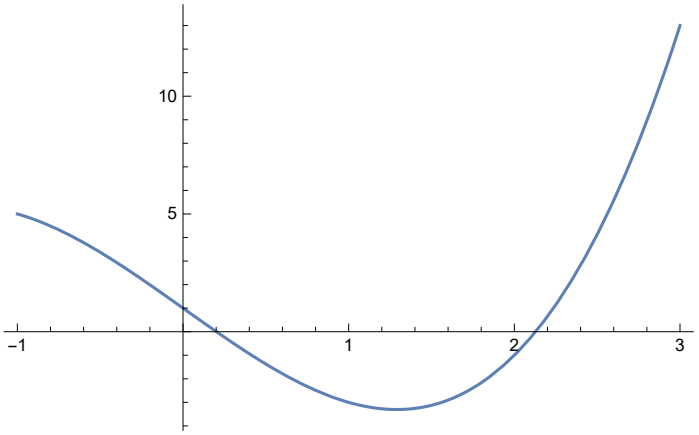
In5th number of iterations the root is :2.12842

estimated error is: 0.000166952

Return[2.12842]

root is : 2.12842

Estimated error is :$8.77361 \times 10^{-7}$




In[1]:=
```
x0 = Input["Enter first guess: "];
x1 = Input ["Enter scond guess: "];
Nmax = Input["Enter maximum of iterations : " ];
eps = Input["Enter the value of covergence parameter: "];
Print["x0=", x0];
Print["x1=", x1];
Print["Nmax=", Nmax];
Print["epsilon=", eps];
f[x_] := Cos[x] - x * Exp[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["In", i, "th number of 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=1
x1=2
Nmax=20
epsilon=1.×10^-6
f[x]:=-ℯ^x x+Cos[x]
In1th number of iterations the root is :0.832673
estimated error is: 1.16733
In2th number of iterations the root is :0.728779
estimated error is: 0.103894
In3th number of iterations the root is :0.562401
estimated error is: 0.166377
In4th number of iterations the root is :0.524782
estimated error is: 0.0376189
In5th number of iterations the root is :0.518014
estimated error is: 0.00676874
In6th number of iterations the root is :0.517759
estimated error is: 0.0002547
In7th number of iterations the root is :0.517757
estimated error is: 1.50138×10^-6
```

Out[11]=
```
Return[0.517757]
```

```
root is : 0.517757
Estimated error is :3.22103×10^-10
```

Out[14]=