PRACTICAL-2(a): SECANT METHOD

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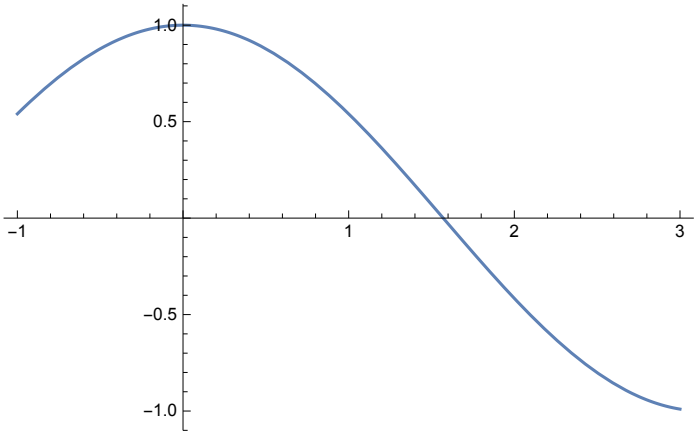
COURSE:- B.Sc.(H) COMPUTER SCIENCE

Secant Method:Taking parameter as input

```
x0 = Input["Enter first guess :"];
x1 = Input["Enter second guess :"];
Nmax = Input["Enter maximum number of iterations :"];
eps = Input["Enter a value of convergence 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 Numer 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 = 1
x1 = 2
Nmax = 20
epsilon = 1/1000000
f[x] := Cos[x]
In1th Numer of iteration the root is:1.5649
Estimated error is : 0.435096
In2th Numer of iteration the root is:1.57098
Estimated error is : 0.0060742
In3th Numer of iteration 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 second guess :"];
Nmax = Input["Enter maximum number of iterations :"];
eps = Input["Enter a value of convergence 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 Numer 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 = 0
```

```
x1 = 1
```

```
Nmax = 20
```

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

```
f[x] := Cos[x]
```

```
In1th Numer of iteration the root is:2.17534
```

```
Estimated error is : 1.17534
```

```
In2th Numer of iteration the root is:1.57278
```

```
Estimated error is : 0.602559
```

```
In3th Numer of iteration the root is:1.57067
```

```
Estimated error is : 0.00211435
```

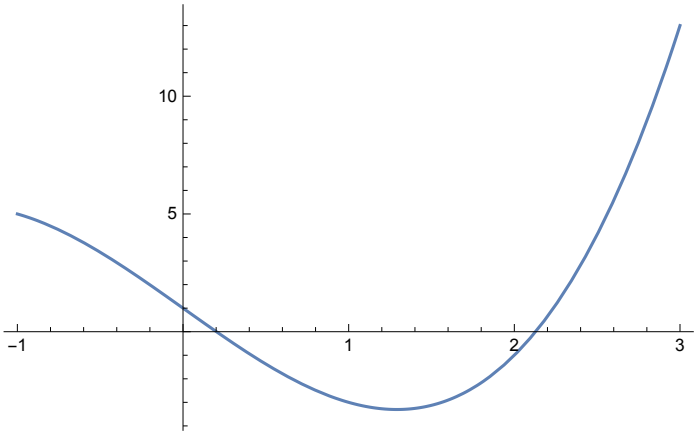
```
In4th Numer of iteration the root is:1.5708
```

```
Estimated error is : 0.000126873
```

```
Return[1.5708]
```

```
Root is:1.5708
```

$$\text{Estimated error is : } 7.81941 \times 10^{-11}$$




```
x0 = Input["Enter first guess :"];
x1 = Input["Enter second guess :"];
Nmax = Input["Enter maximum number of iterations :"];
eps = Input["Enter a value of convergence 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 Numer 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 = 0
x1 = 1
Nmax = 20
epsilon = 1/1000000
f[x] := Cos[x]
In1th Numer of iteration the root is:2.17534
Estimated error is : 1.17534
In2th Numer of iteration the root is:1.57278
Estimated error is : 0.602559
In3th Numer of iteration the root is:1.57067
Estimated error is : 0.00211435
In4th Numer of iteration the root is:1.5708
Estimated error is : 0.000126873
Return[1.5708]
Root is:1.5708
Estimated error is : 7.81941×10^-11
```