Name: Vimal Joshi

Rol no:20201430

COURSE= Bsc (H) COMPUTER SCIENCE

practical-2 Secant method

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
```

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

```
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}
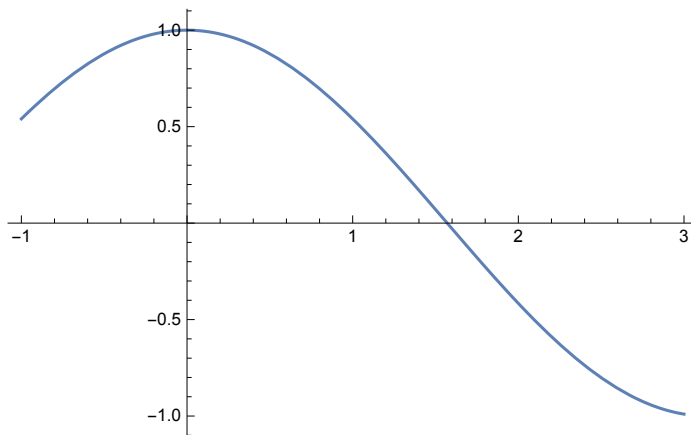
```
x0 = Input["Enter first guess :"];
x1 = Input["Enter second guess :"];
Nmax = Input["Enter maximum number of iterations :"];
eps = Input["Enter a value of convergence parameter :"];
Print["x0 = ", x0];
Print["x1 = ", x1];
Print["Nmax = ", Nmax];
Print["epsilon = ", eps];
f[x_] := x³ - 5 * x + 1;
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

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

f[x] := Cos[x]

In1th Numer of iteration the root is:2.17534
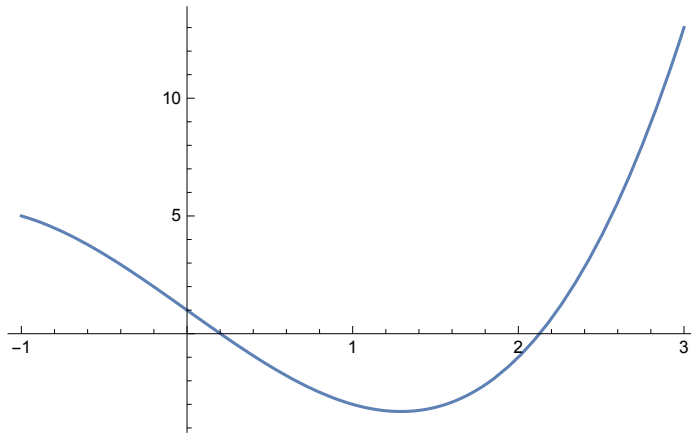
Estimated error is : 1.17534

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

Estimated error is : 7.81941×10^{-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
          ─────────
          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

Estimated error is : 7.81941×10^{-11}