

PRACTICAL-3

Regular Falsi method

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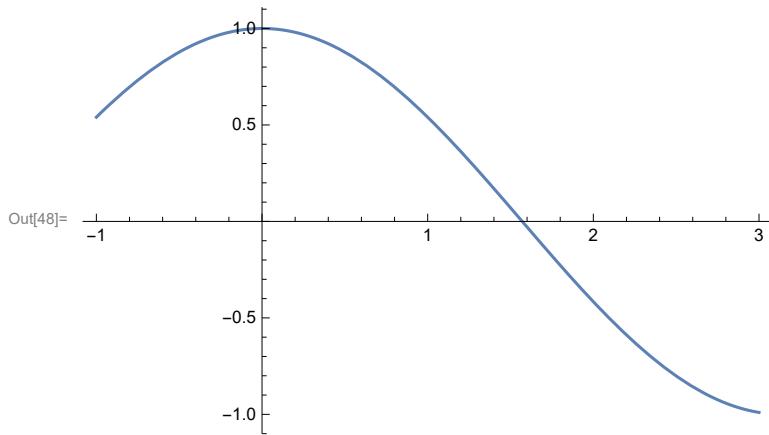
Ques:1

```
In[42]:= x0 = 0;
x1 = 2.0;
Nmax = 20;
eps = 0.0001;
f[x_] := Cos[x];
If[N[f[x0]] * N[f[x1]] > 0,
  Print["These values do not satisfy the IVP so change the value."],
  For[i = 1, i ≤ Nmax, i++, x2 = N[x1 - f[x1] * (x1 - x0) / (f[x1] - f[x0])];
    If[Abs[x1 - x0] < eps, Return[N[x2]], Print[i, " th iterations value is: ", N[x2]];
      Print["Estimated error in ", i, " th iteration is : ", N[x1 - x0]]];
    If[f[x2] * f[x1] > 0, x1 = x2, x0 = x2]];
  Print["Root is :", N[x2]];
  Print["Estimated error in ", i, " th iteration is : ", N[x1 - x0]]];
If[N[f[x0]] * N[f[x1]] < 0, Plot[f[x], {x, -1, 3}]]
```

```

1th iterations value is: 1.41228
Estimated error in 1 th iteration is : 2.
2th iterations value is: 1.57391
Estimated error in 2 th iteration is : 0.587717
3th iterations value is: 1.57078
Estimated error in 3 th iteration is : 0.161623
4th iterations value is: 1.5708
Estimated error in 4 th iteration is : 0.0031228
Out[47]= Return[1.5708]

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Ques:2

```

In[49]:= x0 = 0;
x1 = 2.0;
Nmax = 20;
eps = 0.0001;
f[x_] := Cos[x] - x^(E^x);
If[N[f[x0]] * N[f[x1]] > 0,
  Print["These values do not satisfy the IVP so change the value."],
  For[i = 1, i ≤ Nmax, i++, x2 = N[x1 - f[x1] * (x1 - x0) / (f[x1] - f[x0])];
   If[Abs[x1 - x0] < eps, Return[N[x2]], Print[i, "th iterations value is: ", N[x2]];
   Print["Estimated error in ", i, " th iteration is : ", N[x1 - x0]];
   If[f[x2] * f[x1] > 0, x1 = x2, x0 = x2]];
  Print["Root is :", N[x2]];
  Print["Estimated error in ", i, " th iteration is : ", N[x1 - x0]]];
If[N[f[x0]] * N[f[x1]] < 0, Plot[f[x], {x, -1, 3}]]

```

1th iterations value is: 0.123501
 Estimated error in 1 th iteration is : 2.
 2th iterations value is: 0.223208
 Estimated error in 2 th iteration is : 1.8765

```
3th iterations value is: 0.30105
Estimated error in 3 th iteration is : 1.77679
4th iterations value is: 0.360215
Estimated error in 4 th iteration is : 1.69895
5th iterations value is: 0.404262
Estimated error in 5 th iteration is : 1.63979
6th iterations value is: 0.436544
Estimated error in 6 th iteration is : 1.59574
7th iterations value is: 0.459931
Estimated error in 7 th iteration is : 1.56346
8th iterations value is: 0.47673
Estimated error in 8 th iteration is : 1.54007
9th iterations value is: 0.488724
Estimated error in 9 th iteration is : 1.52327
10th iterations value is: 0.497249
Estimated error in 10 th iteration is : 1.51128
11th iterations value is: 0.50329
Estimated error in 11 th iteration is : 1.50275
12th iterations value is: 0.507561
Estimated error in 12 th iteration is : 1.49671
13th iterations value is: 0.510576
Estimated error in 13 th iteration is : 1.49244
14th iterations value is: 0.512701
Estimated error in 14 th iteration is : 1.48942
15th iterations value is: 0.514199
Estimated error in 15 th iteration is : 1.4873
16th iterations value is: 0.515254
Estimated error in 16 th iteration is : 1.4858
17th iterations value is: 0.515996
Estimated error in 17 th iteration is : 1.48475
18th iterations value is: 0.516518
Estimated error in 18 th iteration is : 1.484
19th iterations value is: 0.516886
Estimated error in 19 th iteration is : 1.48348
20th iterations value is: 0.517144
Estimated error in 20 th iteration is : 1.48311
```

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Root is :0.517144

Estimated error in 21 th iteration is : 1.48286

Out[55]=

