```
In[◦]:= BisectionMWE[a0_, b0_, n_, f_] :=
    Module[{}, a = N[a0]; b = N[b0]; m = (a + b) / 2;
     i = 0;
     If[f[a] * f[b] > 0, Print["We cannot continue with the Bisection Method"]; Return[]];
     Output = {{i, a, m, b, f[m]}};
     While[i < n, If[Sign[f[a]] == Sign[f[m]], a = m, b = m];
      m = (a + b) / 2; i++;
      Output = Append[Output, {i, a, m, b, f[m]}];];
     Print[NumberForm[
       TableForm[Output, TableHeadings → {None, {"i", "ai", "mi", "bi", "f[mi]"}}], 8]];
     Print["Root after ", n, " iterations = ", NumberForm[m, 8]];
     Print["Accuracy = ", Abs[(b - a) / 2]];
     Print["Function value at approximated root, f[m]= ", NumberForm[f[m], 8]];];
```
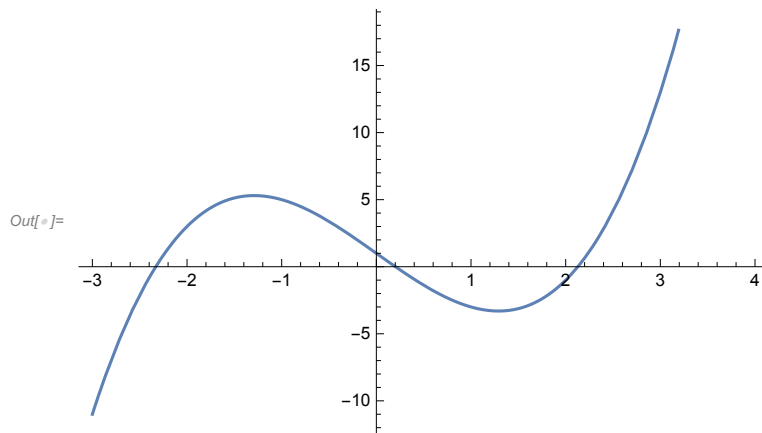
```
In[◦]:= f[x_] := x^3 - 5 x + 1;
    Plot[f[x], {x, -3, 4}]
```

Out[◦]=


```
In[◦]:= BisectionMWE[3, 4, 10, f]
```

We cannot continue with the Bisection Method

```
In[◦]:= BisectionMWE[0, 1, 10, f]
```

i	ai	mi	bi	f[mi]
0	0.	0.5	1.	−1.375
1	0.	0.25	0.5	−0.234375
2	0.	0.125	0.25	0.37695313
3	0.125	0.1875	0.25	0.069091797
4	0.1875	0.21875	0.25	−0.083282471
5	0.1875	0.203125	0.21875	−0.0072441101
6	0.1875	0.1953125	0.203125	0.030888081
7	0.1953125	0.19921875	0.203125	0.011812866
8	0.19921875	0.20117188	0.203125	0.0022820756
9	0.20117188	0.20214844	0.203125	−0.0024815956
10	0.20117188	0.20166016	0.20214844	−0.000099904253

Root after 10 iterations = 0.20166016

Accuracy = 0.000488281

Function value at approximated root, f[m]= −0.000099904253

In[ ]:= **f[x_] := Cos[x] - x Exp[x]**
Plot[f[x], {x, -1, 1}]

Out[ ]=
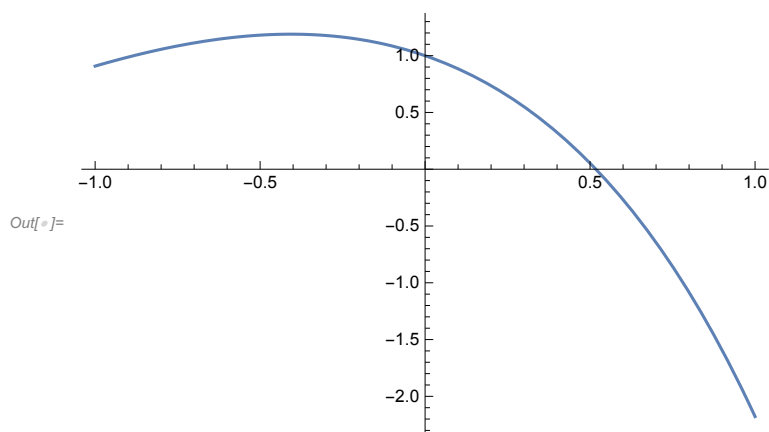
In[ ]:= **BisectionMWE[0, 1, 10, f]**

i	ai	mi	bi	f[mi]
0	0.	0.5	1.	0.053221927
1	0.5	0.75	1.	-0.85606114
2	0.5	0.625	0.75	-0.3566906
3	0.5	0.5625	0.625	-0.14129375
4	0.5	0.53125	0.5625	-0.041512212
5	0.5	0.515625	0.53125	0.0064753408
6	0.515625	0.5234375	0.53125	-0.017362025
7	0.515625	0.51953125	0.5234375	-0.0054044018
8	0.515625	0.51757813	0.51953125	0.00054518442
9	0.51757813	0.51855469	0.51953125	-0.0024271775
10	0.51757813	0.51806641	0.51855469	-0.00094038902

Root after 10 iterations = 0.51806641

Accuracy = 0.000488281

Function value at approximated root, f[m]= -0.00094038902

In[ ]:= **f[x_] = x^4 - 3 x^2 + x - 10;**
Plot[f[x], {x, 0, 3}]

Out[ ]=
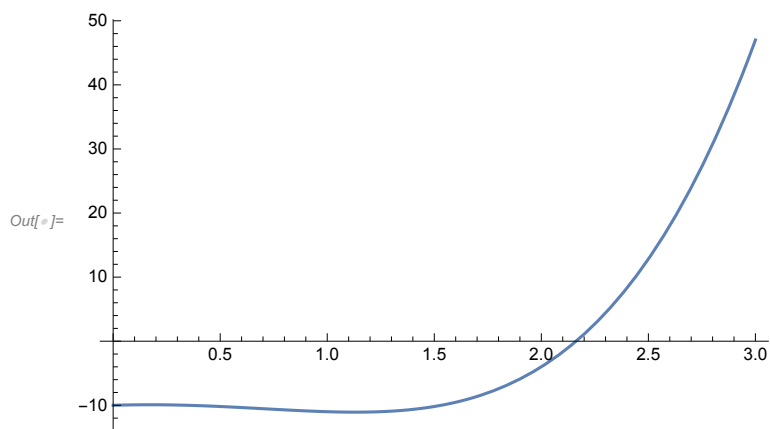
In[ ]:= **BisectionMWE[2, 3, 12, f]**

i	ai	mi	bi	f[mi]
0	2.	2.5	3.	12.8125
1	2.	2.25	2.5	2.6914063
2	2.	2.125	2.25	−1.0310059
3	2.125	2.1875	2.25	0.72975159
4	2.125	2.15625	2.1875	−0.17494106
5	2.15625	2.171875	2.1875	0.2712279
6	2.15625	2.1640625	2.171875	0.046611492
7	2.15625	2.1601563	2.1640625	−0.06454622
8	2.1601563	2.1621094	2.1640625	−0.0090629158
9	2.1621094	2.1630859	2.1640625	0.018750376
10	2.1621094	2.1625977	2.1630859	0.004837755
11	2.1621094	2.1623535	2.1625977	−0.0021140738
12	2.1623535	2.1624756	2.1625977	0.0013614672

Root after 12 iterations = 2.1624756

Accuracy = 0.00012207

Function value at approximated root, f[m]= 0.0013614672