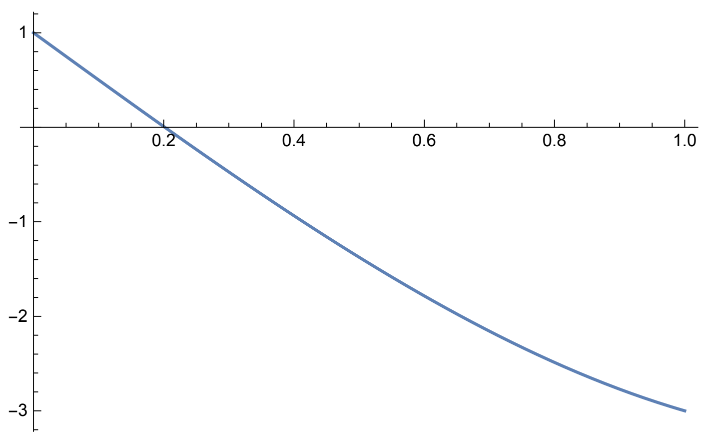
```
In[]:= BisectionMWE[a0_, b0_, error_, f_] :=
  Module[{}, a = N[a0]; b = N[b0]; m = (a + b) / 2;
   i = 0;
   If[f[a] * f[b] > 0, Print["We cannot continue with Bisection Method"]; Return[]];
   Output = {{i, a, m, b, (b - a) / 2}};
   While[Abs[b - a] > 2 error, If[Sign[f[a]] == Sign[f[m]], a = m, b = m];
    m = (a + b) / 2; i++;
    Output = Append[Output, {i, a, m, b, (b - a) / 2}];];
   Print[NumberForm[TableForm[Output,
      TableHeadings → {None, {"i", "ai", "mi", "bi", "(bi-ai)/2"}}], 8]];
   Print["Number of iterations required to achieve desired accuracy= ", i];
   Print["Root after ", i, "iterations = ", NumberForm[m, 8]];
   Print["Functions value at approximated root, f[m]= ", NumberForm[f[m], 8]];];
f[x_] := x^3 - 5 x + 1;
error = 10^(-2);
a = 0; b = 1;
Plot[f[x], {x, 0, 1}]
```

Out[]=




```
In[]:= BisectionMWE[a, b, error, f]
```

i	ai	mi	bi	(bi-ai)/2
0	0.	0.5	1.	0.5
1	0.	0.25	0.5	0.25
2	0.	0.125	0.25	0.125
3	0.125	0.1875	0.25	0.0625
4	0.1875	0.21875	0.25	0.03125
5	0.1875	0.203125	0.21875	0.015625
6	0.1875	0.1953125	0.203125	0.0078125

Number of iterations required to achieve desired accuracy= 6

Root after 6iterations = 0.1953125

Functions value at approximated root, f[m]= 0.030888081

```
In[]:= f[x_] := x^3 - 5 x + 1;
error = 10^(-4);
a = 0; b = 1;
BisectionMWE[a, b, error, f]
```

i	ai	mi	bi	(bi−ai)/2
0	0.	0.5	1.	0.5
1	0.	0.25	0.5	0.25
2	0.	0.125	0.25	0.125
3	0.125	0.1875	0.25	0.0625
4	0.1875	0.21875	0.25	0.03125
5	0.1875	0.203125	0.21875	0.015625
6	0.1875	0.1953125	0.203125	0.0078125
7	0.1953125	0.19921875	0.203125	0.00390625
8	0.19921875	0.20117188	0.203125	0.001953125
9	0.20117188	0.20214844	0.203125	0.0009765625
10	0.20117188	0.20166016	0.20214844	0.00048828125
11	0.20117188	0.20141602	0.20166016	0.00024414063
12	0.20141602	0.20153809	0.20166016	0.00012207031
13	0.20153809	0.20159912	0.20166016	0.000061035156

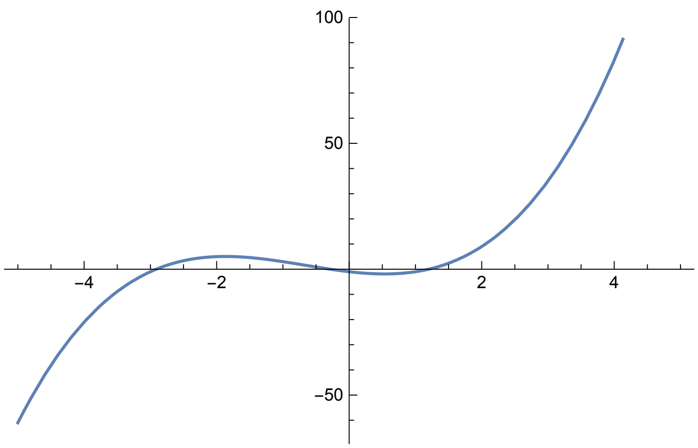
Number of iterations required to achieve desired accuracy= 13

Root after 13iterations = 0.20159912

Functions value at approximated root, f[m]= 0.00019782746

In[∘]:=
```
f[x_] := x^3 + 2 x^2 - 3 x - 1;
error = 10^(-5);
a = 1; b = 2;
Plot[f[x], {x, -5, 5}]
```

Out[∘]=



In[∘]:=
```
BisectionMWE[a, b, error, f]
```

i	ai	mi	bi	(bi−ai)/2
0	1.	1.5	2.	0.5
1	1.	1.25	1.5	0.25
2	1.	1.125	1.25	0.125
3	1.125	1.1875	1.25	0.0625
4	1.1875	1.21875	1.25	0.03125
5	1.1875	1.203125	1.21875	0.015625
6	1.1875	1.1953125	1.203125	0.0078125
7	1.1953125	1.1992188	1.203125	0.00390625
8	1.1953125	1.1972656	1.1992188	0.001953125
9	1.1972656	1.1982422	1.1992188	0.0009765625
10	1.1982422	1.1987305	1.1992188	0.00048828125
11	1.1982422	1.1984863	1.1987305	0.00024414063
12	1.1984863	1.1986084	1.1987305	0.00012207031
13	1.1986084	1.1986694	1.1987305	0.000061035156
14	1.1986694	1.1987	1.1987305	0.000030517578
15	1.1986694	1.1986847	1.1987	0.000015258789
16	1.1986847	1.1986923	1.1987	7.6293945×10^{-6}

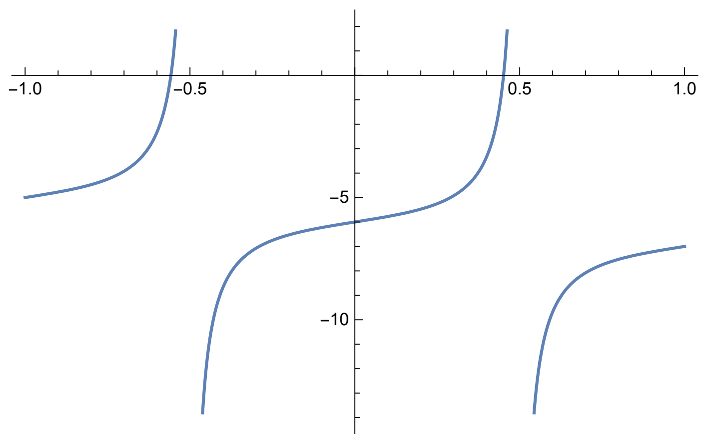
Number of iterations required to achieve desired accuracy= 16

Root after 16iterations = 1.1986923

Functions value at approximated root, f[m]= 6.5831663×10^{-6}

In[◦]:=
```
f[x_] := Tan[Pi x] - x - 6;
error = 5 * 10^(-5);
Plot[f[x], {x, -1, 1}]
```

Out[◦]=



In[◦]:=
```
BisectionMWE[0, 0.5, error, f]
```

i	ai	mi	bi	(bi−ai)/2
0	0.	0.25	0.5	0.25
1	0.25	0.375	0.5	0.125
2	0.375	0.4375	0.5	0.0625
3	0.4375	0.46875	0.5	0.03125
4	0.4375	0.453125	0.46875	0.015625
5	0.4375	0.4453125	0.453125	0.0078125
6	0.4453125	0.44921875	0.453125	0.00390625
7	0.44921875	0.45117188	0.453125	0.001953125
8	0.44921875	0.45019531	0.45117188	0.0009765625
9	0.45019531	0.45068359	0.45117188	0.00048828125
10	0.45068359	0.45092773	0.45117188	0.00024414063
11	0.45092773	0.4510498	0.45117188	0.00012207031
12	0.45092773	0.45098877	0.4510498	0.000061035156
13	0.45098877	0.45101929	0.4510498	0.000030517578

Number of iterations required to achieve desired accuracy= 13

Root after 13iterations = 0.45101929

Functions value at approximated root, f[m]= −0.0037148206