In[86]:=
```
f[x_] := Cos[x]
x0 = 0;
x1 = 2;
n = 14;
If[f[x0] * f[x1] > 0,
Print["These values do not fit in IVT. Please change the values"],
For[i = 1, i ≤ n, i++, a = (x0 + x1) / 2;
Print[i, "th iteration is", a];
If[f[x0] * f[a] < 0, x1 = a, x0 = a];];];
```

```
1th iteration is1
2th iteration is3/2
3th iteration is7/4
4th iteration is13/8
5th iteration is25/16
6th iteration is51/32
7th iteration is101/64
8th iteration is201/128
9th iteration is403/256
10th iteration is805/512
11th iteration is1609/1024
12th iteration is3217/2048
13th iteration is6433/4096
14th iteration is12867/8192
```

In[61]:=
```
f[x_] := (x ^ 3) - (5 * x) + 1
x0 = 0;
x1 = 1;
n = 14
If[f[x0] * f[x1] > 0,
  Print["These values do not fit in IVT. Please change the values"],
For[i = 0, i ≤ n, i++, a = (x0 + x1) / 2;
Print[i, "TH ITERATION VALUE IS : " , a];
If[f[x0] * f[a] < 0, x1 = a, x0 = a];];];
```

Out[64]= 14

0TH ITERATION VALUE IS : $\frac{1}{2}$

1TH ITERATION VALUE IS : $\frac{1}{4}$

2TH ITERATION VALUE IS : $\frac{1}{8}$

3TH ITERATION VALUE IS : $\frac{3}{16}$

4TH ITERATION VALUE IS : $\frac{7}{32}$

5TH ITERATION VALUE IS : $\frac{13}{64}$

6TH ITERATION VALUE IS : $\frac{25}{128}$

7TH ITERATION VALUE IS : $\frac{51}{256}$

8TH ITERATION VALUE IS : $\frac{103}{512}$

9TH ITERATION VALUE IS : $\frac{207}{1024}$

10TH ITERATION VALUE IS : $\frac{413}{2048}$

11TH ITERATION VALUE IS : $\frac{825}{4096}$

12TH ITERATION VALUE IS : $\frac{1651}{8192}$

13TH ITERATION VALUE IS : $\frac{3303}{16\,384}$

14TH ITERATION VALUE IS : $\frac{6607}{32\,768}$

In[66]:=
```
f[x_] := Tan[Pi * x] - x - 6
x0 = 0.4;
x1 = 0.48;
n = 14
If[f[x0] * f[x1] > 0,
  Print["These values do not fit in IVT. Please change the values"],
For[i = 0, i ≤ n, i++, a = (x0 + x1)/2;
Print[i, "TH ITERATION VALUE IS : " , a];
If[f[x0] * f[a] < 0, x1 = a, x0 = a];];];
```

Out[69]= 14

```
0TH ITERATION VALUE IS : 0.44
1TH ITERATION VALUE IS : 0.46
2TH ITERATION VALUE IS : 0.45
3TH ITERATION VALUE IS : 0.455
4TH ITERATION VALUE IS : 0.4525
5TH ITERATION VALUE IS : 0.45125
6TH ITERATION VALUE IS : 0.450625
7TH ITERATION VALUE IS : 0.450937
8TH ITERATION VALUE IS : 0.451094
9TH ITERATION VALUE IS : 0.451016
10TH ITERATION VALUE IS : 0.451055
11TH ITERATION VALUE IS : 0.451035
12TH ITERATION VALUE IS : 0.451045
13TH ITERATION VALUE IS : 0.45105
14TH ITERATION VALUE IS : 0.451047
```

In[91]:=
```
f[x_] := (x ^ 3) + (2 * x * x) - (3 * x) - 1
x0 = -3;
x1 = -2;
n = 14
If[f[x0] * f[x1] > 0,
  Print["These values do not fit in IVT. Please change the values"],
For[i = 0, i ≤ n, i++, a = (x0 + x1)/2;
Print[i, "TH ITERATION VALUE IS : " , a];
If[f[x0] * f[a] < 0, x1 = a, x0 = a];];];
```

Out[94]= 14

0TH ITERATION VALUE IS : $-\frac{5}{2}$

1TH ITERATION VALUE IS : $-\frac{11}{4}$

2TH ITERATION VALUE IS : $-\frac{23}{8}$

3TH ITERATION VALUE IS : $-\frac{47}{16}$

4TH ITERATION VALUE IS : $-\frac{93}{32}$

5TH ITERATION VALUE IS : $-\frac{187}{64}$

6TH ITERATION VALUE IS : $-\frac{373}{128}$

7TH ITERATION VALUE IS : $-\frac{745}{256}$

8TH ITERATION VALUE IS : $-\frac{1491}{512}$

9TH ITERATION VALUE IS : $-\frac{2983}{1024}$

10TH ITERATION VALUE IS : $-\frac{5965}{2048}$

11TH ITERATION VALUE IS : $-\frac{11\,929}{4096}$

12TH ITERATION VALUE IS : $-\frac{23\,857}{8192}$

13TH ITERATION VALUE IS : $-\frac{47\,713}{16\,384}$

14TH ITERATION VALUE IS : $-\frac{95\,427}{32\,768}$

In[76]:=
```
f[x_] := (x ^ 7) - 3
x0 = 1;
x1 = 2;
n = 14
If[f[x0] * f[x1] > 0,
  Print["These values do not fit in IVT. Please change the values"],
For[i = 0, i ≤ n, i++, a = (x0 + x1) / 2;
Print[i, "TH ITERATION VALUE IS : " , a];
If[f[x0] * f[a] < 0, x1 = a, x0 = a];];];
```

Out[79]= 14

0TH ITERATION VALUE IS : $\frac{3}{2}$

1TH ITERATION VALUE IS : $\frac{5}{4}$

2TH ITERATION VALUE IS : $\frac{9}{8}$

3TH ITERATION VALUE IS : $\frac{19}{16}$

4TH ITERATION VALUE IS : $\frac{37}{32}$

5TH ITERATION VALUE IS : $\frac{75}{64}$

6TH ITERATION VALUE IS : $\frac{149}{128}$

7TH ITERATION VALUE IS : $\frac{299}{256}$

8TH ITERATION VALUE IS : $\frac{599}{512}$

9TH ITERATION VALUE IS : $\frac{1199}{1024}$

10TH ITERATION VALUE IS : $\frac{2397}{2048}$

11TH ITERATION VALUE IS : $\frac{4793}{4096}$

12TH ITERATION VALUE IS : $\frac{9585}{8192}$

13TH ITERATION VALUE IS : $\frac{19\,169}{16\,384}$

14TH ITERATION VALUE IS : $\frac{38\,337}{32\,768}$

In[81]:=
```
f[x_] := Exp[-1 * x] - x
x0 = 0;
x1 = 1;
n = 14
If[f[x0] * f[x1] > 0,
  Print["These values do not fit in IVT. Please change the values"],
For[i = 0, i ≤ n, i++, a = (x0 + x1)/2;
Print[i, "TH ITERATION VALUE IS : " , a];
If[f[x0] * f[a] < 0, x1 = a, x0 = a];];];
```

Out[84]= 14

0TH ITERATION VALUE IS : $\frac{1}{2}$

1TH ITERATION VALUE IS : $\frac{3}{4}$

2TH ITERATION VALUE IS : $\frac{5}{8}$

3TH ITERATION VALUE IS : $\frac{9}{16}$

4TH ITERATION VALUE IS : $\frac{19}{32}$

5TH ITERATION VALUE IS : $\frac{37}{64}$

6TH ITERATION VALUE IS : $\frac{73}{128}$

7TH ITERATION VALUE IS : $\frac{145}{256}$

8TH ITERATION VALUE IS : $\frac{291}{512}$

9TH ITERATION VALUE IS : $\frac{581}{1024}$

10TH ITERATION VALUE IS : $\frac{1161}{2048}$

11TH ITERATION VALUE IS : $\frac{2323}{4096}$

12TH ITERATION VALUE IS : $\frac{4647}{8192}$

13TH ITERATION VALUE IS : $\frac{9293}{16\,384}$

14TH ITERATION VALUE IS : $\frac{18\,585}{32\,768}$