Practical-2

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NA Practicals

Newton Method

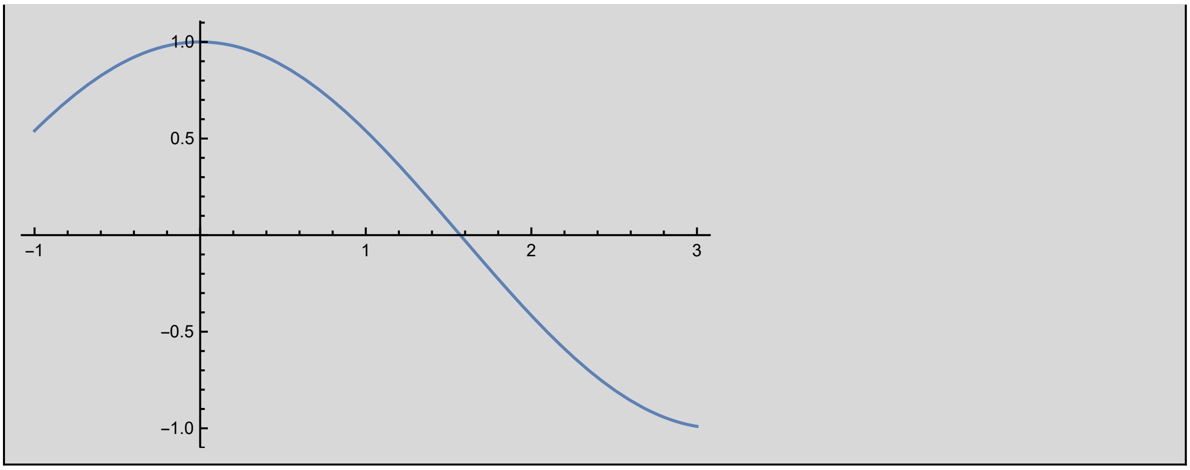
Ques-1. Find the root of the function f[x]=Cos[x] with maximum number of iteration is 5.

In[26]:=

```
x0 = 1;
NMax = 5;
f[x_] := Cos[x];
For[i = 1, i ≤ NMax, i++,
  x1 = N[x0 - (f[x0]) / (f'[x0])];
  x0 = x1;
  Print["The final approximation of the root for iteration ", i, " : ", x1]];
Plot[f[x], {x, -1, 3}]
```

```
The final approximation of the root for iteration 1 : 1.64209
The final approximation of the root for iteration 2 : 1.57068
The final approximation of the root for iteration 3 : 1.5708
The final approximation of the root for iteration 4 : 1.5708
The final approximation of the root for iteration 5 : 1.5708
```

Out[30]=

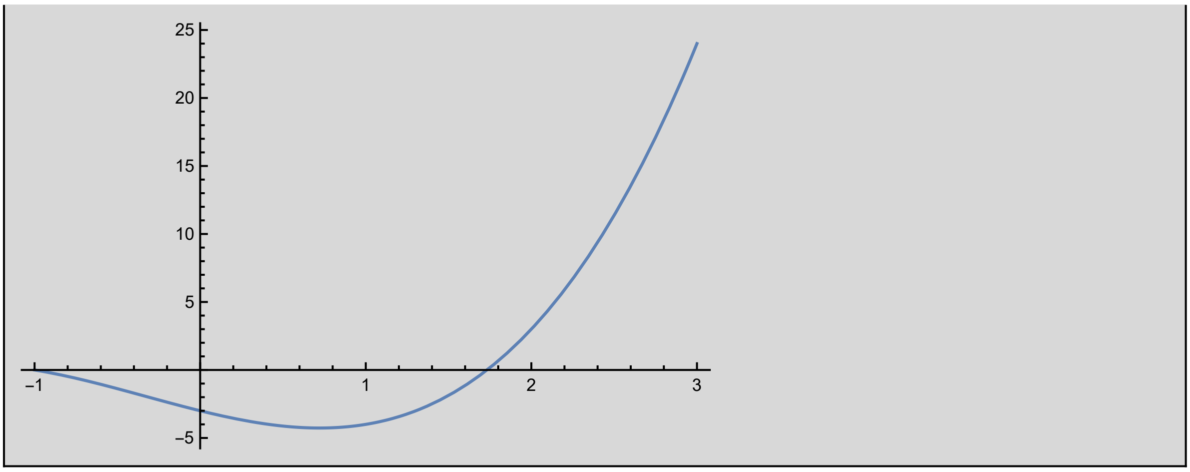


Ques-2. f(x)=x^3+x^2-3x-3,   (1,2)

In[31]:=
```
x0 = 1;
NMax = 5;
f[x_] := x^3 + x^2 - 3 x - 3;
For[i = 1, i ≤ NMax, i++,
  x1 = N[x0 - (f[x0]) / (f'[x0])];
  x0 = x1;
  Print["The final approximation of the root for iteration ", i, " : ", x1]];
Plot[f[x], {x, -1, 3}]
```

```
The final approximation of the root for iteration 1 : 3.
The final approximation of the root for iteration 2 : 2.2
The final approximation of the root for iteration 3 : 1.83015
The final approximation of the root for iteration 4 : 1.7378
The final approximation of the root for iteration 5 : 1.73207
```

Out[35]=

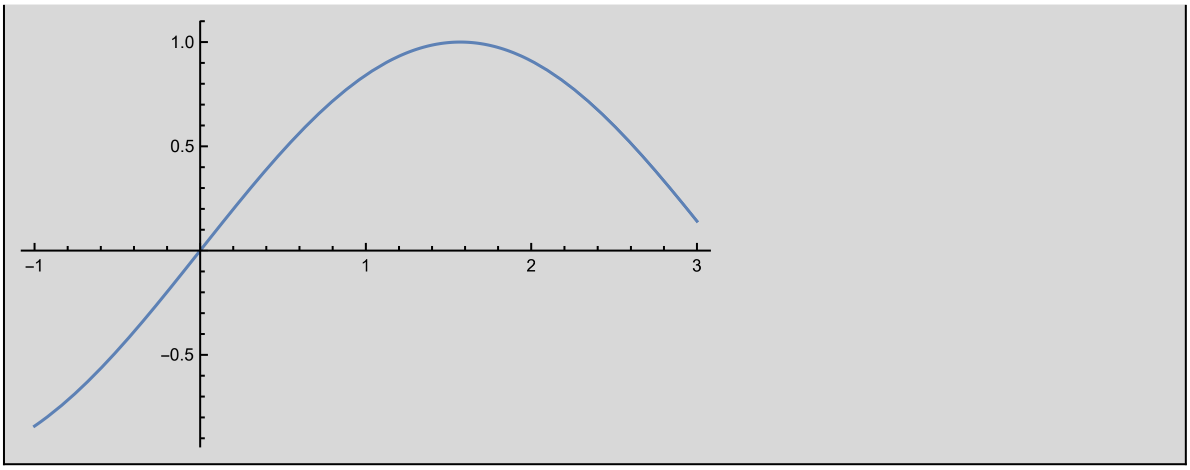


Ques-3. f(x)=Sinx, (3,4)

In[36]:=
```
x0 = 3;
NMax = 5;
f[x_] := Sin[x];
For[i = 1, i ≤ NMax, i++,
  x1 = N[x0 - (f[x0]) / (f'[x0])];
  x0 = x1;
  Print["The final approximation of the root for iteration ", i, " : ", x1]];
Plot[f[x], {x, -1, 3}]
```

```
The final approximation of the root for iteration 1 : 3.14255
The final approximation of the root for iteration 2 : 3.14159
The final approximation of the root for iteration 3 : 3.14159
The final approximation of the root for iteration 4 : 3.14159
The final approximation of the root for iteration 5 : 3.14159
```

Out[40]=



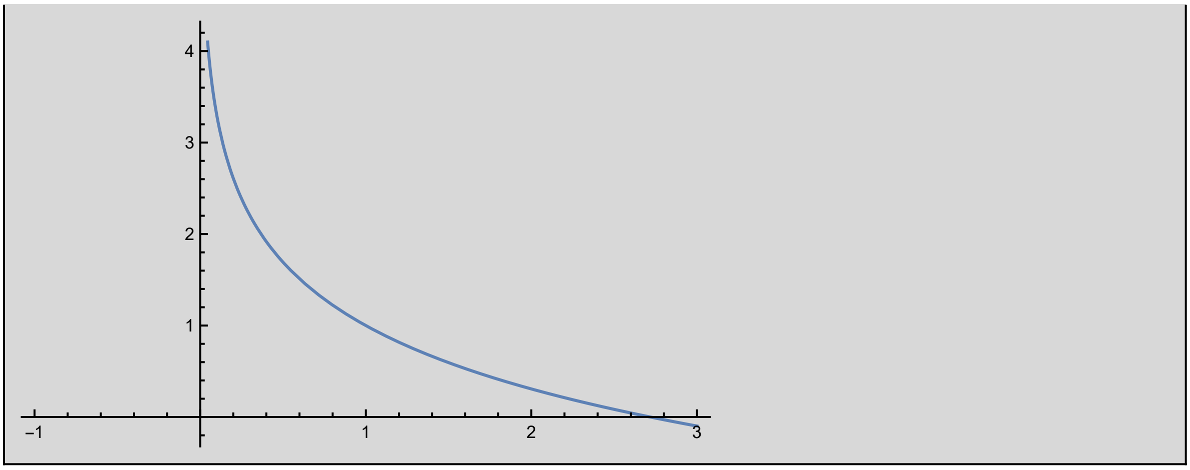
Ques-4. f(x)=1-logx, (2,3)

In[41]:=

```
x0 = 2;
NMax = 5;
f[x_] := 1 - Log[x];
For[i = 1, i ≤ NMax, i++,
  x1 = N[x0 - (f[x0]) / (f'[x0])];
  x0 = x1;
  Print["The final approximation of the root for iteration ", i, " : ", x1]];
Plot[f[x], {x, -1, 3}]
```

```
The final approximation of the root for iteration 1 : 2.61371
The final approximation of the root for iteration 2 : 2.71624
The final approximation of the root for iteration 3 : 2.71828
The final approximation of the root for iteration 4 : 2.71828
The final approximation of the root for iteration 5 : 2.71828
```

Out[45]=



Ques-5. f(x)=x^2-5, (2,3)

In[46]:=

```
x0 = 2;
NMax = 5;
f[x_] := x^2 - 5;
For[i = 1, i ≤ NMax, i++,
  x1 = N[x0 - (f[x0]) / (f'[x0])];
  x0 = x1;
  Print["The final approximation of the root for iteration ", i, " : ", x1]];
Plot[f[x], {x, -1, 3}]
```

```
The final approximation of the root for iteration 1 : 2.25
The final approximation of the root for iteration 2 : 2.23611
The final approximation of the root for iteration 3 : 2.23607
The final approximation of the root for iteration 4 : 2.23607
The final approximation of the root for iteration 5 : 2.23607
```

Out[50]=