3. Newton Raphson

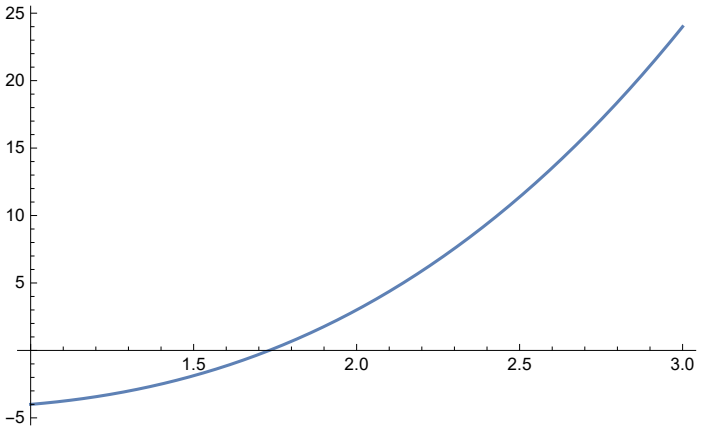
In[1]:=
```
newtonraphson[f_, p0_, n_] := Module[{}, p1 = N[p0];
  i = 1;
  df[x_] = D[f[x], x];
  Print["_____________________"];
  Print["Sno.", "       ", "Root"];
  Print["_____________________"];
  While[i ≤ n,
   p2 = N[p1 - N[f[p1]] / N[df[p1]]];
   Print[i, "        ", p2];
   i++;
   p1 = p2];
  Print["Root = ", p2];
  Plot[f[x], {x, 1, 3}]
 ]
```

Question - 1

In[2]:=
```
f[x_] := x^3 + x^2 - 3 * x - 3;
newtonraphson[f, 2, 5]
```

```
--------------------
Sno.      Root

--------------------
1       1.76923

2       1.73292

3       1.73205

4       1.73205

5       1.73205

Root = 1.73205
```

Out[3]=



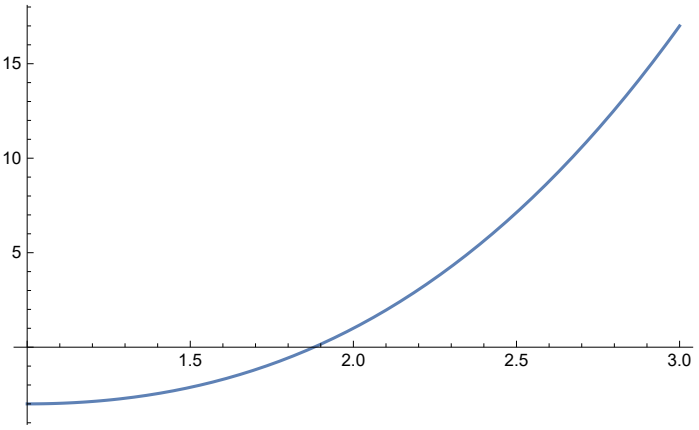
Question -2

In[6]:=
```
f[x_] = x^3 - 3 * x - 1
newtonraphson[f, 0, 3]
```

Out[6]= $-1 - 3\,x + x^3$

```
--------------------
Sno.       Root

--------------------
1        -0.333333

2        -0.347222

3        -0.347296

Root = -0.347296
```

Out[7]=



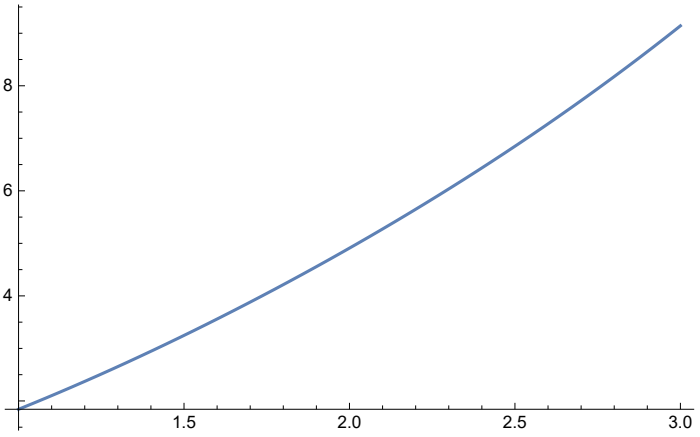
Question - 3

In[18]:=
```
f[x_] = Sin[x] + x^2
newtonraphson[f, -10, 10]
```

Out[18]= $x^2 + \text{Sin}[x]$

```
--------------------
Sno.       Root

--------------------
1        -5.17522
2        -2.38061
3        -1.47317
4        -1.06073
5        -0.906166
6        -0.877734
7        -0.876727
8        -0.876726
9        -0.876726
10        -0.876726
Root = -0.876726
```

Out[19]=



Question - 4

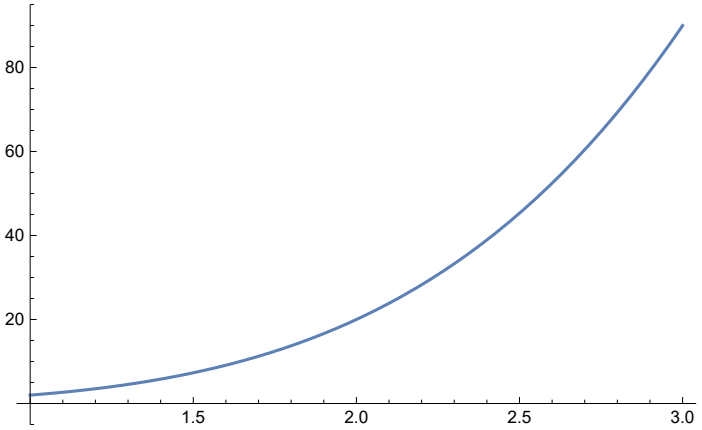
In[28]:=

```
f[x_] = x^4 + x^2
newtonraphson[f, 1, 10]
```

Out[28]= $x^2 + x^4$

```
--------------------
Sno.      Root
--------------------
1       0.666667
2       0.411765
3       0.23195
4       0.121608
5       0.0616776
6       0.0309552
7       0.0154924
8       0.00774807
9       0.00387427
10       0.00193716
Root = 0.00193716
```

Out[29]=



In[5]:=

In[30]:=