4. Regula Falsi Method

In[31]:=
```
regulafalsi[f_, a0_, b0_, n_] := Module[{}, a = N[a0];
  b = N[b0]; c = (a * f[b] - b * f[a]) / (f[b] - f[a]); k = 0;
  Print["_____________________________________________"];
  Print["S.No.", "            ", "C", "              ", "F[C]"];
  Print["_____________________________________________"];
  While[k < n, If[f[a] * f[c] < 0, b = c, a = c;
    Print[k, "      ", NumberForm[c, 10], "      ", NumberForm[f[c], 10]];];
   c = (a * f[b] - b * f[a]) / (f[b] - f[a]);
   k = k + 1;];
  Print[" "];
  Print["c = ", NumberForm[c, 16]];
  Print["f[c]", NumberForm[f[c], 16]];
  Plot[f[x], {x, -3, 3},
   GridLines → Automatic, GridLinesStyle → Directive[Black, Dashed],
   PlotStyle → {Thickness[0.004], Magenta}, PlotLegends → {f[x]}, Frame -> True]]
```

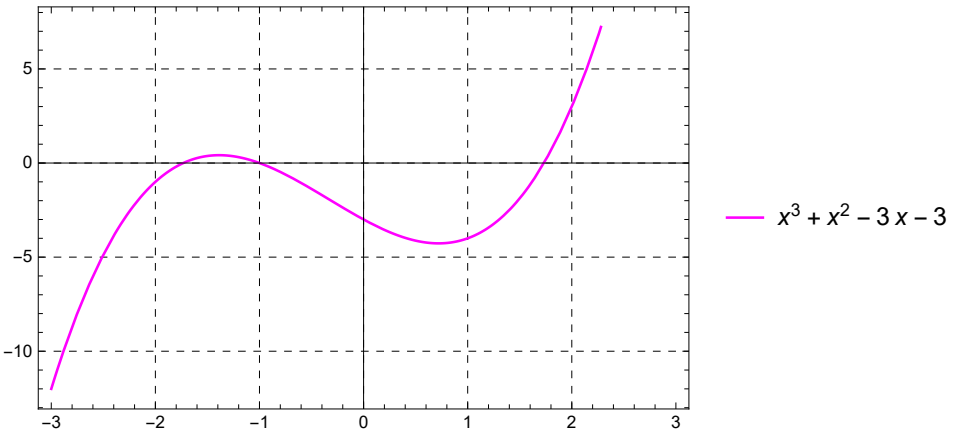
Question - 1

In[32]:=
```
f[x_] := x^3 + x^2 - 3 * x - 3
regulafalsi[f, 1, 2, 5]
```

```
-----------------------------------------
S.No.          C              F[C]
-----------------------------------------
0      1.571428571      -1.364431487
1      1.705410822      -0.2477450996
2      1.727882728      -0.03933955131
3      1.731404866      -0.006110673094
4      1.731950853      -0.000945920667
```

```
c = 1.732035343851165
f[c]-0.0001463487141180053
```

Out[33]=



Question - 2

In[50]:=
```
f[x_] = x^2 - 3 * x + 1
regulafalsi[f, 1, 3, 10]
```

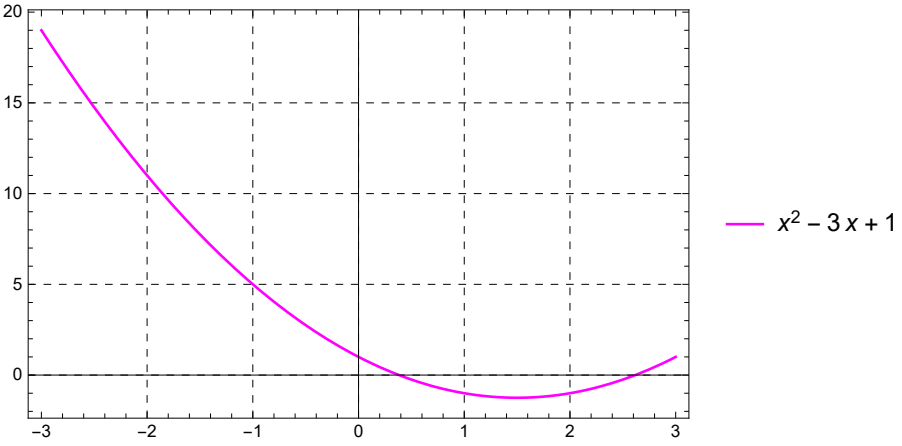
Out[50]= $1 - 3x + x^2$

S.No.	C	F[C]
0	2.	−1.
1	2.5	−0.25
2	2.6	−0.04
3	2.615384615	−0.005917159763
4	2.617647059	−0.0008650519031
5	2.617977528	−0.000126246686
6	2.618025751	−0.00001841993774
7	2.618032787	-2.68744961×10^{-6}
8	2.618033813	$-3.920939751\times10^{-7}$
9	2.618033963	$-5.720574681\times10^{-8}$

c = 2.618033985017358

f[c] $-8.34620639267314\times10^{-9}$

Out[51]=



Question - 3

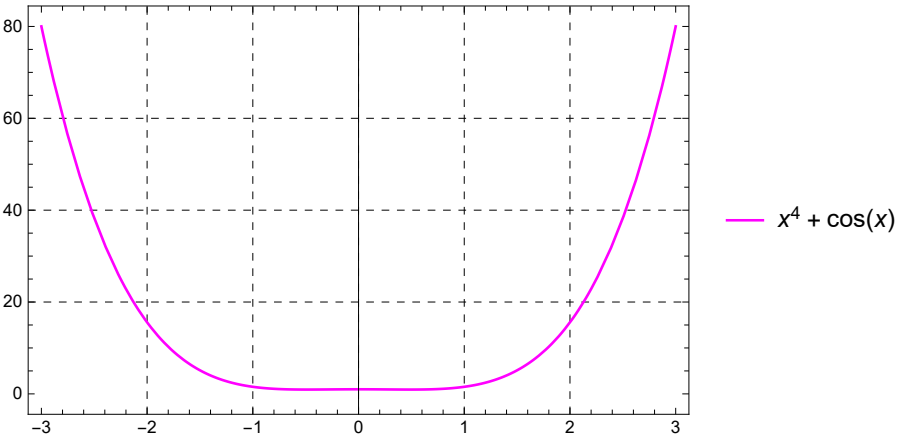
In[65]:=
```
f[x_] = Cos[x] + x^4
regulafalsi[f, 0, 1, 5]
```

Out[65]= $x^4 + \text{Cos}[x]$

```
-----------------------------------------
S.No.            C              F[C]
-----------------------------------------
0       -1.850815718       11.45780491
1       1.442764494       4.460613441
2       0.7664662634       1.065487768
3       0.2424146185       0.9742144899
4       -1.061359522       1.756651926
```

```
c = 15.67586039879742
f[c]60383.51084576982
```

Out[66]=



Question -4

In[73]:=
```
f[x_] = x^3
regulafalsi[f, 1, 3, 5]
```

Out[73]= x^3

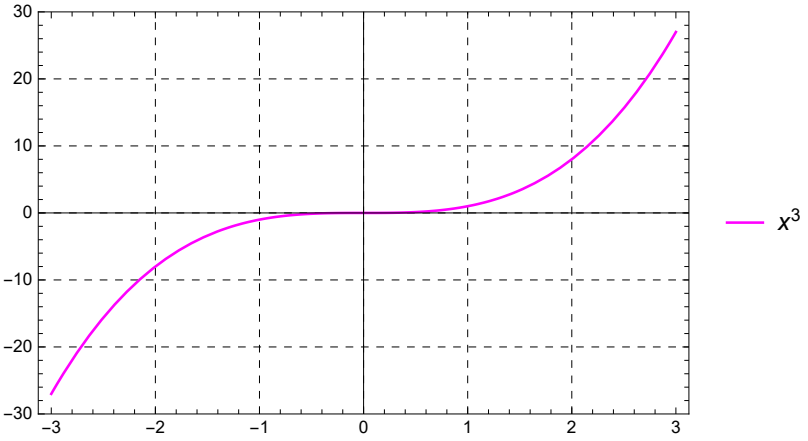
```
_____________________________________________
S.No.            C                F[C]

_____________________________________________
0       0.9230769231       0.7865270824
1       0.8607594937       0.6377426532
2       0.8090080485       0.5294909319
3       0.7651815256       0.4480159007
4       0.7274730739       0.384991171


c = 0.6946005391326552

f[c]0.3351238588812435
```

Out[74]=



In[54]:=