2. Secant Method

In[ ]:=
```
secant[f_, a0_, b0_, n_] := Module[{}, p0 = N[a0];
  p1 = N[b0];
  If[f[p0] * f[p1] > 0, Print["Secant method cannot be applied"];
   Return[]];
  Print["_____________________________________________"];
  Print["S.No.", "            ", "P0", "              ", "P1"];
  Print["_____________________________________________"];
  i = 1;
  While[i <= n, p2 = N[p1 - ((p1 - p0) * f[p1] / (f[p1] - f[p0]))];
   Print[i, "            ", p0, "              ", p1];
   i++;
   p0 = p1;
   p1 = p2];
  Print["The root of the equation is : ", p2];
  Plot[f[x], {x, -3, 3},
   GridLines → Automatic, GridLinesStyle → Directive[Black, Dashed],
   PlotStyle → {Thickness[0.004], Magenta}, PlotLegends → {f[x]}, Frame -> True]]
```

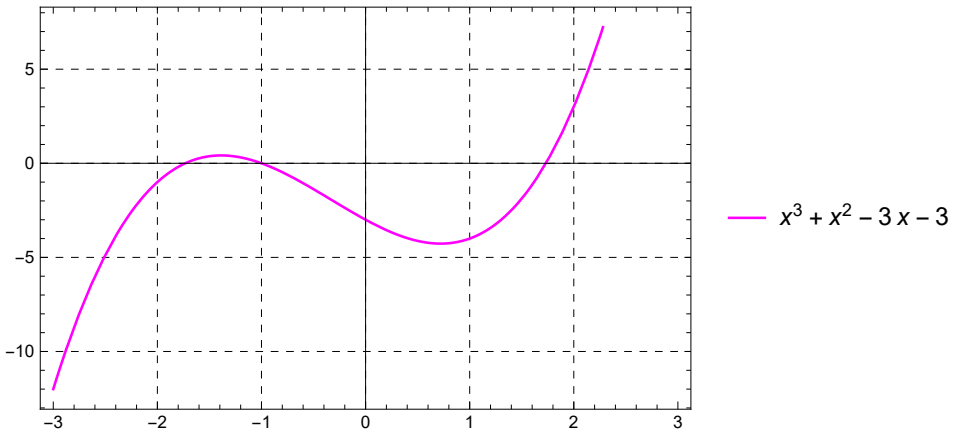
Question - 1

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

```
_____________________________________
S.No.           P0              P1

_____________________________________
1           1.              2.
2           2.              1.57143
3           1.57143             1.70541
4           1.70541             1.73514
5           1.73514             1.732
The root of the equation is : 1.73205
```

Out[ ]=



In[ ]:=

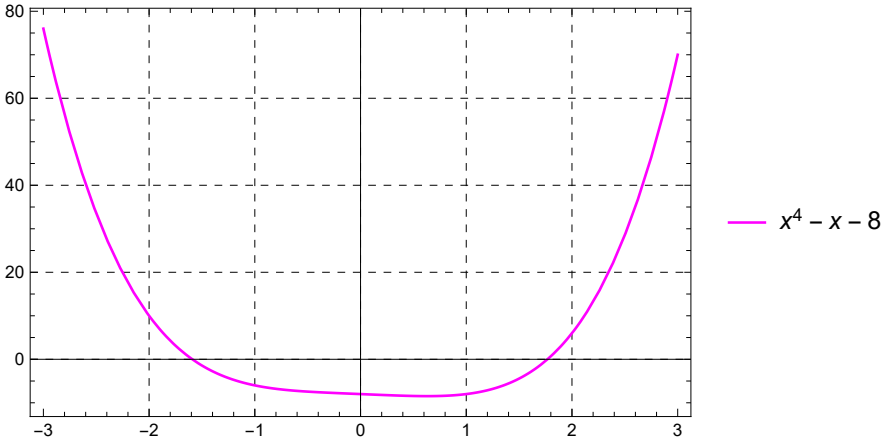
Question-2

In[ ]:=
```
f[x_] := x^4 - x - 8
secant[f, 1, 2, 5]
```

```
----------------------------------------
S.No.           P0              P1

----------------------------------------
1               1.              2.
2               2.              1.57143
3               1.57143             1.72857
4               1.72857             1.77564
5               1.77564             1.76759
The root of the equation is : 1.76787
```

Out[ ]=



Question - 3

In[ ]:=

```
f[x_] = x^2 - 4 x + 4
secant[f, 2, 2.5, 5]
```

Out[ ]= $4 - 4\,x + x^2$

```
----------------------------------------
S.No.           P0              P1

----------------------------------------
1               2.              2.5
2               2.5              2.
```

Power: Infinite expression $\frac{1}{0.}$ encountered.

Infinity: Indeterminate expression 0. ComplexInfinity encountered.

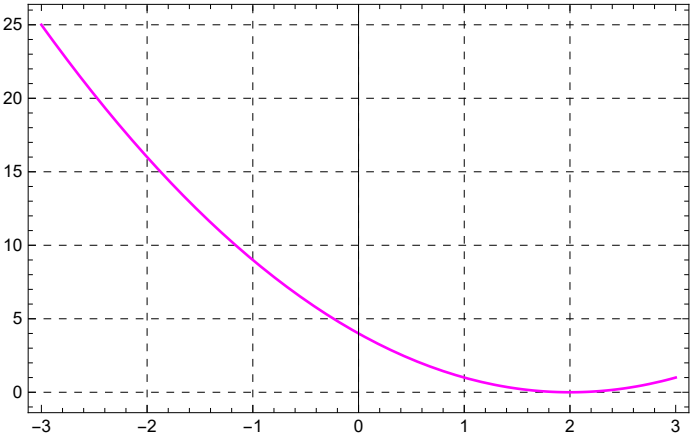
```
3            2.              2.

4            2.              Indeterminate

5            Indeterminate              Indeterminate

The root of the equation is : Indeterminate
```

Out[•]=



Question -4

In[•]:=
```
f[x_] = x^3 - x^2 - 8 * x
secant[f, 1, 4, 5]
```

Out[•]= $-8x - x^2 + x^3$

```
_____________________________________________

S.No.            P0              P1

_____________________________________________

1            1.              4.

2            4.              2.

3            2.              2.85714

4            2.85714              4.39024

5            4.39024              3.16833

The root of the equation is : 3.29775
```

Out[•]=