

1. Bisection Method

Find the solution of equation using Bisection Method

Function :

```
In[ ]:=
bisection[f_, ao_, bo_, n_] := Module[{}, a = N[ao];
  b = N[bo];
  If [f[a] * f[b] > 0,
    Print["Bisection Method can not be applied !!"] ×
    Return[]];
  p = (a + b) / 2;
  i = 1;
  While[i ≤ n,
    If [f[a] * f[p] < 0, b = p, a = p];
    Print[i, " ", a, " ", b];
    i++;
    p = (a + b) / 2];
  Print["Root = ", p];
  Plot[f[x], {x, -3, 3},
    GridLines → Automatic, GridLinesStyle → Directive[Black, Dashed],
    PlotStyle → {Thickness[0.004], Blue}, PlotLegends → {f[x]}, Frame -> True]
]
```

Question -1

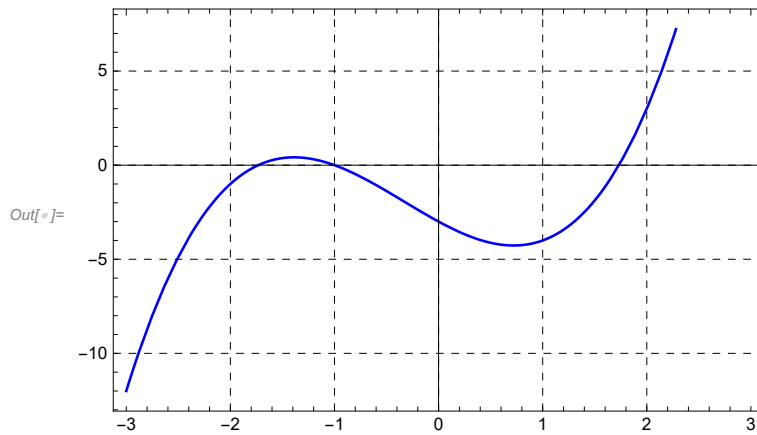
```
In[ ]:= f[x_] := x^3 + x^2 - 3 * x - 3
```

```
In[ ]:= bisection[f, 1, 2, 5]
```

```

1      1.5      2.
2      1.5      1.75
3      1.625     1.75
4      1.6875    1.75
5      1.71875   1.75
Root   = 1.73438

```



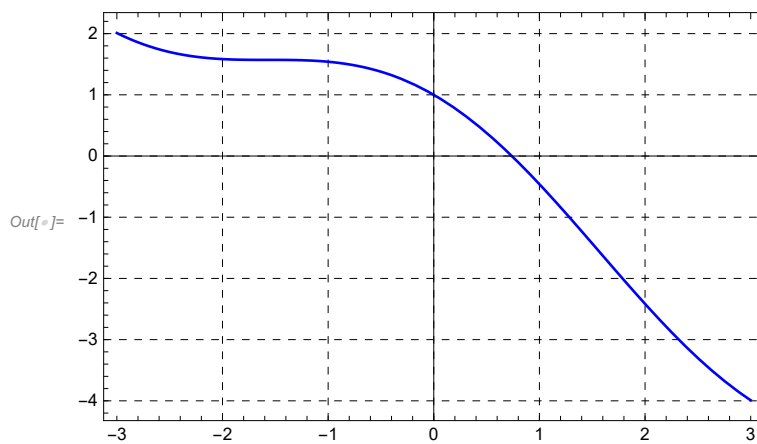
$$x^3 + x^2 - 3x - 3$$

Question -2

```

In[ ]:= f[x_] := Cos[x] - x
bisection[f, 0, 1, 5]
1      0.5      1.
2      0.5      0.75
3      0.625     0.75
4      0.6875    0.75
5      0.71875   0.75
Root   = 0.734375

```



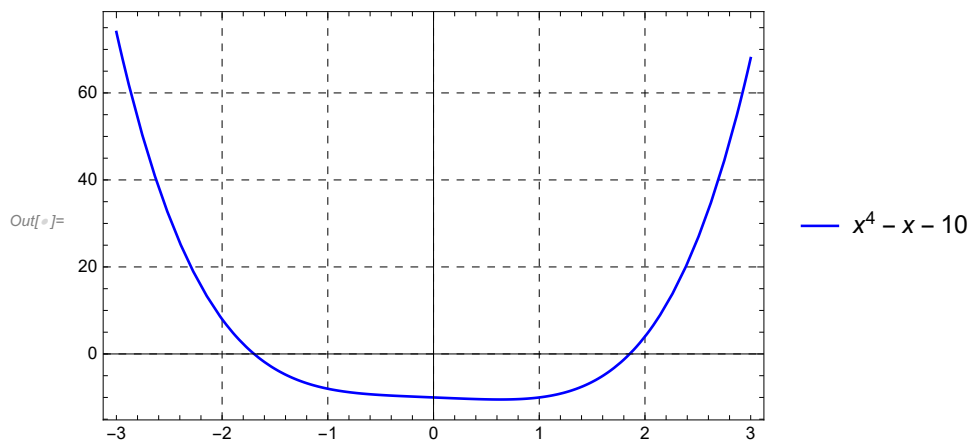
$$\cos(x) - x$$

Question - 3

```
In[ ]:= f[x_] = x^4 - x - 10
        bisection[f, 1.5, 2, 5]
```

```
Out[ ]:= -10 - x + x^4
```

1	1.75	2.
2	1.75	1.875
3	1.8125	1.875
4	1.84375	1.875
5	1.84375	1.85938
Root = 1.85156		



Question - 4

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

```
Out[ ]:= 3 x^2 -
```

Bisection Method can not be applied !!

1	1.5	2.
2	1.75	2.
3	1.875	2.
4	1.9375	2.
5	1.96875	2.

Root = 1.98438

