NA Assignment - 1

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Ques). Perform 15 iterations from bisection method

1). x^3 + 2x^2 - 3x - 1 = 0 ; (1,2)

In[•]:=
```
f[x_] = x^3 + 2 * x^2 - 3 * x - 1
x0 = 1.0;
x1 = 2.0;
n = 15;
If[f[x0] * f[x1] > 0,
  Print["Range not fit for IVT"],
  For[i = 0, i < n, i++, a = (x0 + x1) / 2;
    Print["Intermediate value is ", a];
    If[f[x0] * f[a] < 0, x1 = a, x0 = a];];];
```

Out[•]= $-1 - 3\,x + 2\,x^2 + x^3$

```
Intermediate value is 1.5
Intermediate value is 1.25
Intermediate value is 1.125
Intermediate value is 1.1875
Intermediate value is 1.21875
Intermediate value is 1.20313
Intermediate value is 1.19531
Intermediate value is 1.19922
Intermediate value is 1.19727
Intermediate value is 1.19824
Intermediate value is 1.19873
Intermediate value is 1.19849
Intermediate value is 1.19861
Intermediate value is 1.19867
Intermediate value is 1.1987
```

2). tan(πx) - x - 6 = 0 ; (0.40,0.48)

In[ ]:=
```
f[x_] = Tan[π * x] – x – 6
x0 = 0.40;
x1 = 0.48;
n = 15;
If[f[x0] * f[x1] > 0,
  Print["Range not fit for IVT"],
  For[i = 0, i < n, i++, a = (x0 + x1) / 2;
    Print["Intermediate value is ", a];
    If[f[x0] * f[a] < 0, x1 = a, x0 = a];];];
```

Out[ ]=
$$-6 - x + \text{Tan}[\pi x]$$

```
Intermediate value is 0.44
Intermediate value is 0.46
Intermediate value is 0.45
Intermediate value is 0.455
Intermediate value is 0.4525
Intermediate value is 0.45125
Intermediate value is 0.450625
Intermediate value is 0.450937
Intermediate value is 0.451094
Intermediate value is 0.451016
Intermediate value is 0.451055
Intermediate value is 0.451035
Intermediate value is 0.451045
Intermediate value is 0.45105
Intermediate value is 0.451047
```

3). x^3 - 13 = 0 ; (2,3)

In[ ]:=
```
f[x_] = x^3 – 13
x0 = 2.0;
x1 = 3.0;
n = 15;
If[f[x0] * f[x1] > 0,
  Print["Range not fit for IVT"],
  For[i = 0, i < n, i++, a = (x0 + x1) / 2;
    Print["Intermediate value is ", a];
    If[f[x0] * f[a] < 0, x1 = a, x0 = a];];];
```

Out[ ]=
$$-13 + x^3$$

```
Intermediate value is 2.5
Intermediate value is 2.25
Intermediate value is 2.375
Intermediate value is 2.3125
Intermediate value is 2.34375
Intermediate value is 2.35938
Intermediate value is 2.35156
Intermediate value is 2.34766
Intermediate value is 2.34961
Intermediate value is 2.35059
Intermediate value is 2.35107
Intermediate value is 2.35132
Intermediate value is 2.35144
Intermediate value is 2.35138
Intermediate value is 2.35135
```

4). x^5 + 2x - 1 = 0 ; (0,1)

In[ ]:=
```
f[x_] = x^5 + 2 * x - 1
x0 = 0.00;
x1 = 1.00;
n = 15;
If[f[x0] * f[x1] > 0,
  Print["Range not fit for IVT"],
  For[i = 0, i < n, i++, a = (x0 + x1) / 2;
    Print["Intermediate value is ", a];
    If[f[x0] * f[a] < 0, x1 = a, x0 = a];];];
```

Out[ ]= $-1 + 2\,x + x^5$

```
Intermediate value is 0.5
Intermediate value is 0.25
Intermediate value is 0.375
Intermediate value is 0.4375
Intermediate value is 0.46875
Intermediate value is 0.484375
Intermediate value is 0.492188
Intermediate value is 0.488281
Intermediate value is 0.486328
Intermediate value is 0.487305
Intermediate value is 0.486816
Intermediate value is 0.486572
Intermediate value is 0.48645
Intermediate value is 0.486389
Intermediate value is 0.486359
```