Practical-3

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NM Practicals

Regula Falsi Method

Ques1. x^3-5x+1, (0,1)

In[51]:=
```
ClearAll;
RegulaFalsi[a0_, b0_, m_] :=
  Module[{a = N[a0], b = N[b0]},
    c = (a * f[b] - b * f[a]) / (f[b] - f[a]);
    k = 0;
    While[k < m,
      If[Sign[f[b]] == Sign[f[c]],
        b = c,
        a = c;
      ];
      c = (a * f[b] - b * f[a]) / (f[b] - f[a]);
      k = k + 1;
      Print["Value at ", k, "th iteration is = ", NumberForm[c, 16]];
    ];
  ];
RegulaFalsi[0, 1, 10];
f[x_] := x^3 - 5 x + 1;
```

```
Value at 1th iteration is = 1.666666666666667

Value at 2th iteration is = 2.

Value at 3th iteration is = 2.142857142857143

Value at 4th iteration is = 2.2

Value at 5th iteration is = 2.222222222222222

Value at 6th iteration is = 2.23076923076923

Value at 7th iteration is = 2.234042553191489

Value at 8th iteration is = 2.235294117647059

Value at 9th iteration is = 2.235772357723577

Value at 10th iteration is = 2.235955056179775
```

Ques2 Tan[πx]-x-6

In[55]:=

```
RegulaFalsi[a0_, b0_, m_] :=
  Module[{a = N[a0], b = N[b0]},
    c = (a * f[b] - b * f[a])/(f[b] - f[a]);
    k = 0;
    While[k < m,
     If[Sign[f[b]] == Sign[f[c]],
       b = c,
       a = c;
     ];
      c = (a * f[b] - b * f[a])/(f[b] - f[a]);
     k = k + 1;
     Print["Value at ", k, "th iteration is = ", NumberForm[c, 16]];
    ];
  ];
RegulaFalsi[0.4, 0.48, 10];
f[x_] := Tan[πx] - x - 6;
```

```
Value at 1th iteration is = 0.202344500250745

Value at 2th iteration is = 0.2016408305573959

Value at 3th iteration is = 0.2016396776131559

Value at 4th iteration is = 0.2016396757264971

Value at 5th iteration is = 0.2016396757234097

Value at 6th iteration is = 0.2016396757234047

Value at 7th iteration is = 0.2016396757234046

Value at 8th iteration is = 0.2016396757234047

Value at 9th iteration is = 0.2016396757234047

Value at 10th iteration is = 0.2016396757234047
```

Ques3 x^3+2x^2-3x-1

In[58]:=

```
RegulaFalsi[a0_, b0_, m_] :=
  Module[{a = N[a0], b = N[b0]},
    c = (a * f[b] - b * f[a])/(f[b] - f[a]);
    k = 0;
    While[k < m,
      If[Sign[f[b]] == Sign[f[c]],
        b = c,
        a = c;
      ];
      c = (a * f[b] - b * f[a])/(f[b] - f[a]);
      k = k + 1;
      Print["Value at ", k, "th iteration is = ", NumberForm[c, 16]];
    ];
  ];
RegulaFalsi[-3, -2, 10];
f[x_] := x^3 + 2 x^2 - 3 x - 1;
```

Value at 1th iteration is = $-1. (-3. (-4. + \text{Tan}[\pi x]) + 2. (-3. + \text{Tan}[\pi x]))$

Value at 2th iteration is = $-1. (-3. (-4. + \text{Tan}[\pi x]) + 2. (-3. + \text{Tan}[\pi x]))$

Value at 3th iteration is = $-1. (-3. (-4. + \text{Tan}[\pi x]) + 2. (-3. + \text{Tan}[\pi x]))$

Value at 4th iteration is = $-1. (-3. (-4. + \text{Tan}[\pi x]) + 2. (-3. + \text{Tan}[\pi x]))$

Value at 5th iteration is = $-1. (-3. (-4. + \text{Tan}[\pi x]) + 2. (-3. + \text{Tan}[\pi x]))$

Value at 6th iteration is = $-1. (-3. (-4. + \text{Tan}[\pi x]) + 2. (-3. + \text{Tan}[\pi x]))$

Value at 7th iteration is = $-1. (-3. (-4. + \text{Tan}[\pi x]) + 2. (-3. + \text{Tan}[\pi x]))$

Value at 8th iteration is = $-1. (-3. (-4. + \text{Tan}[\pi x]) + 2. (-3. + \text{Tan}[\pi x]))$

Value at 9th iteration is = $-1. (-3. (-4. + \text{Tan}[\pi x]) + 2. (-3. + \text{Tan}[\pi x]))$

Value at 10th iteration is = $-1. (-3. (-4. + \text{Tan}[\pi x]) + 2. (-3. + \text{Tan}[\pi x]))$

Ques4. x^7-3, (1, 2)

In[61]:=

```
RegulaFalsi[a0_, b0_, m_] :=
  Module[{a = N[a0], b = N[b0]},
    c = a * f[b] - b * f[a] ;
        f[b] - f[a]
    k = 0;
    While[k < m,
     If[Sign[f[b]] == Sign[f[c]],
       b = c,
       a = c;
      ];
      c = a * f[b] - b * f[a] ;
          f[b] - f[a]
      k = k + 1;
      Print["Value at ", k, "th iteration is = ", NumberForm[c, 16]];
     ];
    ];
 RegulaFalsi[1, 2, 10];
 f[x_] := x^7 - 3;
```

```
Value at 1th iteration is = 1.151743638077286

Value at 2th iteration is = 1.176840909982786

Value at 3th iteration is = 1.188627673293829

Value at 4th iteration is = 1.194078911293239

Value at 5th iteration is = 1.196582088205248

Value at 6th iteration is = 1.197727754386817

Value at 7th iteration is = 1.198251317792009

Value at 8th iteration is = 1.198490418455614

Value at 9th iteration is = 1.198599576406595

Value at 10th iteration is = 1.19864940371845
```

Ques5. $e^{-x} - x = 0$, $(0, 1)$

In[64]:=
```
ClearAll;
RegulaFalsi[a0_, b0_, m_] :=
  Module[{a = N[a0], b = N[b0]},
     c = (a * f[b] - b * f[a]) / (f[b] - f[a]);
    k = 0;
    While[k < m,
     If[Sign[f[b]] == Sign[f[c]],
      b = c,
       a = c;
      ];
       c = (a * f[b] - b * f[a]) / (f[b] - f[a]);
      k = k + 1;
      Print["Value at ", k, "th iteration is = ", NumberForm[c, 16]];
     ];
    ];
 RegulaFalsi[0, 1, 10];
 f[x_] := e^-x - x = 0;
```

Value at 1th iteration is = 1.001829826166514

Value at 2th iteration is = 1.003646216233007

Value at 3th iteration is = 1.005449161961029

Value at 4th iteration is = 1.007238656730608

Value at 5th iteration is = 1.009014695544169

Value at 6th iteration is = 1.010777275029574

Value at 7th iteration is = 1.012526393442295

Value at 8th iteration is = 1.014262050666711

Value at 9th iteration is = 1.015984248216533

Value at 10th iteration is = 1.01769298923437