CBNST LAB PRACTICAL

Date: September 17, 2021

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Regula Falsi Method

Algorithm:

1. Start

2. Define function f(x)

3. Input
    a. Lower and Upper guesses x0 and x1
    b. tolerable error e

4. If f(x0)*f(x1) > 0
    print "Incorrect initial guesses"
    goto 3
  End If

5. Do

    x2 = x0 - ((x0-x1) * f(x0))/(f(x0) - f(x1))

    If f(x0)*f(x2) < 0
        x1 = x2
    Else
        x0 = x2
    End If

  While abs(f(x2) > e

6. Print root as x2

7. Stop

Code :

```c
#include <stdio.h>
#include <math.h>
#include <stdlib.h>
```

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```
#define phi(x) (x*x)- log(x)- 12
```

```
double differential(double x0)
{
    const double delta = 1.0e-10;
    double x1 = x0 - delta;
    double x2 = x0 + delta;
```

```
    double y1 = phi(x1);
    double y2 = phi(x2);
```

```
    // printf("gradient= %f\n", grad);
    return (y2 - y1) / (x2 - x1);
    // return (pow(-2.718282, -1*x)-cos(x));
}
```

```
int main()
{
    int k = 0;
    double x0, x1, x2, f0, f1, f2, g0;
    int step = 1, N;
    double allErr;
    printf("Enter the allowed Error: ");
    scanf(" %lf", &allErr);
    printf("Enter the interval lower limit: ");
    scanf(" %lf", &x0);
    printf("Enter the interval upper limit: ");
    scanf(" %lf", &x1);
```

```
    f0 = phi(x0);
    f1 = phi(x1);
```

```
    if (f0 * f1 > 0.0)
    {
        printf("\n\nIncorrect Initial Guesses !!!!\n");
        exit(0);
    }
```

```
    printf("Enter maximum iteration:  ");
    scanf("%d", &N);
    {
```

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```
        {
            printf("\nStep\t\tx0\t\tx1\t\tf(x0)\t\tf(x1)\t\tx2=(x0
f1-x1f0)/(f1-f0)\t\tf(x2)\n");
            do
            {
```

```
                x2 = x0 - (x0 - x1) * f0 / (f0 - f1);
                f2 = phi(x2);
                printf("%d\t\t%f\t%f\t%f\t%f\t%f\t\t\t\t%f\n", ste
p, x0, x1, f0, f1, x2, f2);
```

```
                x0=x1;
                x1=x2;
                f0=f1;
                f1=f2;
                // if (f0 * f2 < 0)
                // {
                //     x1 = x2;
                //     f1 = f2;
                // }
                // else
                // {
                //     x0 = x2;
                //     f0 = f2;
                // }
                step = step + 1;
            } while (fabs(f2) > allErr);
```

```
            printf("\nRoot is: %f\n", x2);
        }
    }
}
```

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