Experiment 6

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Source Code

#include <stdio.h>

#include <math.h>

float f(float x)

{

return x\*x\*x - 2\*x\*x + 5;

}

int main()

{

float a, b, r, fa, fb, fr, error, epsilon;

int N, i;

printf("Enter initial guesses a and b: ");

scanf("%f %f", &a, &b);

printf("Enter tolerance: ");

scanf("%f", &epsilon);

printf("Enter max iterations: ");

scanf("%d", &N);

fa = f(a);

fb = f(b);

if (fa \* fb > 0)

{

printf("Invalid interval: f(a) \* f(b) must be < 0\n");

return 0;

}

for (i = 1; i <= N; i++)

{

r = (a + b) / 2;

fr = f(r);

printf("Iteration %d: Approx root = %.6f\n", i, r);

if (fabs(f(r)) < epsilon || fabs(b - a) < epsilon)

{

printf("\nFinal root = %.6f found in %d iterations.\n", r, i);

return 0;

}

if (fa \* fr < 0)

{

b = r;

fb = fr;

}

else

{

a = r;

fa = fr;

}

}

printf("\nDid not converge within %d iterations.\n", N);

return 0;

}

Output

Enter initial guesses a and b: -2

-1

Enter tolerance: 0.0001

Enter max iterations: 20

Iteration 1: Approx root = -1.500000

Iteration 2: Approx root = -1.250000

Iteration 3: Approx root = -1.125000

Iteration 4: Approx root = -1.187500

Iteration 5: Approx root = -1.218750

Iteration 6: Approx root = -1.234375

Iteration 7: Approx root = -1.242188

Iteration 8: Approx root = -1.238281

Iteration 9: Approx root = -1.240234

Iteration 10: Approx root = -1.241211

Iteration 11: Approx root = -1.241699

Iteration 12: Approx root = -1.241943

Iteration 13: Approx root = -1.241821

Iteration 14: Approx root = -1.241882

Iteration 15: Approx root = -1.241913

Final root = -1.241913 found in 15 iterations.