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//*****
//Program for implementation of Secant Method
//Coded by Ashwini K. Singh on 01-Feb-2021
//*****

#include<stdio.h>    // Inclusion of the input-output header file
#include<math.h>     // Inclusion of the math header file

//*****EVALUATION OF THE FUNCTION
float f(float x)
{
    return ((x*x*x)-2*x-5);
}
//*****END OF FUNCTION f

float df(float x_, float x)
{
    return (f(x)-f(x_))/(x-x_);
}
//*****END OF FUNCTION df

//*****STARTING MAIN FUNCTION*****
int main(void)
{
    int i, N;                //Variable declaration
    float h, x_, x0, x1, e;   //Variable declaration

    printf("\nF(x) = ((x*x*x)-x-1)\n");

    FILE *input, *output;
    input=fopen("inSecant.txt","r");
    output=fopen("outSecant.tsv","w");

    printf("\nPlease ensure x_ < x0\n");
    // Reading inputs from the input file
    fscanf(input,"%f,%f,%f,%d",&x,&x0,&e,&N);

    // Displaying inputs read from the input file on the console
    printf("\nValues of x_, x0, allowed error and max iterations read
from 'inSecant.txt' are: %f, %f, %f, %d\n",x_,x0,e,N);
    // Writing the column-headers in the output file
    fprintf(output,"Iteration\tx_\tx0\tx1\tabs(h)\n");

    printf("\nItern\t\tx_\tx0\ttf(x0)\ttdf(x_,x0)\th\t\tx1\t\tabs(h)\n\n");
    for (i=1; i<=N; i++)
    {
        h=f(x0)/df(x_,x0);
        x1=x0-h;
        fprintf(output,"%d\t%9.6f\t%9.6f\t%9.6f\t%9.6f\n", i, x , x0,
x1,fabs(h)); // Writing the outputs in the output file

        printf("%d\t%9.6f\t%9.6f\t%9.6f\t%9.6f\t%9.6f\t%9.6f\n",
i, x , x0,f(x0),df(x,x0),h, x1,fabs(h));
        if (fabs(h) < e)
        {
            printf("\nAfter %d iterations, root = %9.6f\n", i, x1);
// Displaying the final output on console
            return 0;
        }
    }
}
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        x_0 = x0;  
        x0 = x1;  
  
    }  
    printf("\nThe required solution does not converge or iterations are  
insufficient\n");  
    return 1;  
}  
//*****END OF MAIN FUNCTION*****
```