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%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
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% DATE: January 25, 2022
%
% PROGRAM: fordiff1.m
% PURPOSE:  Calculate the square root of x, approximate the derivative of
% the function sqrt(x) and print
% CREDIT: Adapted from an example written by Dr. Lucus
%
% VARIABLES:
%    x = input value
%    h = small value
%    F = the function
%
% JMU PLEDGE
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

x=input('Enter value of x: ');
F = sqrt(x); % F(x)...sortof
Fh = sqrt(x+h); % F(x+h)...sortof
disp('The exact derived quantity is:')
Fprime=1/(2*x^(1/2)) % derivative of the function

disp('For first order');
for i=1:8 % range of i, how small do we want h?
    h=10^(-i); % must be small according to calculus
    Df=(Fh-F)/h % Approximates the derivative of the function
    error=abs(Fprime-Df); % How close is our approximation to the correct
 computation
    fprintf('For h=10^-%d, error=%.6e\n',i,error);
end

disp('For second order');
Fh2=sqrt(x+2*h); % May need this
for i=1:8
    h=10^(-i);
    Df=(-Fh2+4*Fh-3*F)/(2*h) % Approximation...sortof
    error=abs(T-Df);
    fprintf('For h=10^-%d, error=%.6e\n',i,error);
end

Error using input
Cannot call INPUT from EVALC.
Error in testdiff2 (line 19)
x=input('Enter value of x: ');
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