Implementation of the Proposed Method in Matlab

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Implementation

In this file, we provide the implementation of the proposed method (presented in the main paper) in Matlab code by creating a data type `NewAlgorithm(f,a,b,esp,n)`, as given below, where $f$ is a given transcendental equation, $a,b$ are the initial approximation of the root, $esp$ is the relative error and $n$ is the number of iterations required.

```matlab
function root = NewAlgorithm(f,a,b,esp,n)
    if f(a)*f(b) > 0
        error('no root')
    end
    if nargin < 5, n = 100; end
    if nargin < 4, esp = 0.000001; end
    iter = 0;
    c = a;
    ea = 0;
    fd = inline(char(diff(formula(f))),'x');
    disp(' ------------------------------------------------------');
    disp(' No a Root b error % error');
    disp(' ------------------------------------------------------');
    while (1)
        cold = c;
        if fd(a) == 0
            temp = a; a = b; b = temp;
```
end
c = ((a*f(b) - b*f(a))/(2*(f(b) - f(a)))) + ((a - (f(a)/fd(a)))/2);
cnew = c;
disp(sprintf('%4d %10.4f %10.4f %10.4f %10.2e %8.2f',
    iter+1, a, c, b, abs(cold - cnew), ea));
iter = iter + 1;
if c == 0, ea = abs((c - cold)/c) * 100; end
check = f(a)*f(c);
if check < 0
    if abs(f(a)) < abs(f(c))
        c = c;
    else
        b = a;
        a = c;
    end
elseif check > 0
    if abs(f(c)) < abs(f(b))
        a = c;
    else
        a = b;
        b = c;
    end
else
    ea = 0;
end
if ea <= esp | iter >= n, break, end end
disp(' --------------------------------------------------');
disp(['Given function f(x) = ' char(f)]);
disp(sprintf('Approximate root = %10.10f', c));