

HW2

1. Write programs to find a single root of a function $f(x)$ on an interval $[a,b]$ using the bisectional method and/or the false position method. Test your programs on an equation that you may easily solve analytically.

2. Write programs that implement the Newton's method and/or the method of secants to find a root of a single variable function $f(x)$ around some value of x . Test your programs on an equation that you may easily solve analytically.

3. Apply the programs developed above to find a single root for

(a) $e^x \ln x - \cos(x^2) = 0$ between $x = 1.0$ and $x = 4.0$.

(b) $\ln(x^2 + 2) \cos x + \sin x = 0$ between $x = 0.0$ and $x = 4.0$

(c) $e^x - \sin \frac{\pi x}{3} = 0$ between $x = -5.0$ and $x = 2.0$

(d) $x^2 - 6x + 9 = 0$ on $[-5.0,+5.0]$

Report how many iterations did it take to get a tolerance of about $1.0e-6$.

4. Write a program that implements the brute force method (with bisectional or/and Newton's methods inside) to find multiple roots of a function $f(x)$ on $[a,b]$. Find roots for

(e) $\ln(x^2 + 2) \cos x + \sin x = 0$ between $x = -10.0$ and $x = 10.0$

(f) $x^3 - 5x^2 + 7x - 3 = 0$ on $[-10.0, +10.0]$

The results and (the programs) should be sent to ibalitsk@odu.edu, cc to phys420@cox.net by 4 p.m. next Thursday (Oct 10).