數值分析程式作業

(Programming of Numerical Analysis)

HW02

Part1：設計二分法(Bisection Method)程式。完成 Bisection.m

Part2：計算絕對誤差(Absolute error)、相對誤差(Relative error)。完成 ComputeError.m

Part3：計算 $f(x) = \sqrt{x} - \cos x = 0$在[0,1]區間的根。修改 fun.m

繳交檔案說明：

1. 虛擬碼參考課本 P.49

Bisection

To find a solution to $f(x) = 0$ given the continuous function f on the interval $[a, b]$, where $f(a)$ and $f(b)$ have opposite signs:

INPUT endpoints a, b; tolerance TOL; maximum number of iterations N_0.

OUTPUT approximate solution p or message of failure.

Step 1 Set $i = 1$;
$FA = f(a)$.

Step 2 While $i \le N_0$ do Steps 3–6.

Step 3 Set $p = a + (b - a)/2$; (*Compute* p_i.)
$FP = f(p)$.

Step 4 If $FP = 0$ or $(b - a)/2 < TOL$ then
OUTPUT (p); (*Procedure completed successfully.*)
STOP.

Step 5 Set $i = i + 1$.

Step 6 If $FA \cdot FP > 0$ then set $a = p$; (*Compute* a_i, b_i.)
$FA = FP$
else set $b = p$. (FA *is unchanged.*)

Step 7 OUTPUT ('Method failed after N_0 iterations, N_0 =', N_0);
(*The procedure was unsuccessful.*)
STOP.

2. 程式包含以下檔案，完全不用改檔名，請依據說明完成部分程式即可
   - HW02.m
   - Bisection.m
   - f.m
   - ComputeError.m
   - fun.m

3. 此次作業，需完成 Bisection.m、ComputeError.m、fun.m 三個檔案

4. 繳交作業上傳程式碼無須更改檔名，書面檔案名稱請設定為 HW02