

數值分析程式作業
(Programming of Numerical Analysis)
HW03

Part1：設計固定點迭代法(FixedPointIteration)程式。完成 FixedPointIteration.m

Part2：設定不同的迭代方程式。完成 g2.m、g3.m、g4.m、g5.m

$$g1(x) = x - x^3 - 4x^2 + 10$$

$$g2(x) = \left(\frac{10}{x} - 4x\right)^{1/2}$$

$$g3(x) = \frac{1}{2}(10 - x^3)^{1/2}$$

$$g4(x) = \left(\frac{10}{4 + x}\right)^{1/2}$$

$$g5(x) = x - \frac{x^3 + 4x^2 - 10}{3x^2 + 8x}$$

Part3：觀察 g3、g4、g5 三個迭代方程式的收斂情形。

繳交檔案說明：

1. 虛擬碼參考課本 P.59

Fixed-Point Iteration

To find a solution to $p = g(p)$ given an initial approximation p_0 :

INPUT initial approximation p_0 ; tolerance TOL ; maximum number of iterations N_0 .

OUTPUT approximate solution p or message of failure.

Step 1 Set $i = 1$.

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

Step 3 Set $p = g(p_0)$. (Compute p_i .)

Step 4 If $|p - p_0| < TOL$ then
 OUTPUT (p); (The procedure was successful.)
 STOP.

Step 5 Set $i = i + 1$.

Step 6 Set $p_0 = p$. (Update p_0 .)

Step 7 OUTPUT ('The 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

HW03.m

FixedPointIteration.m

g1.m, g2.m, g3.m, g4.m, g5.m

3. 此次作業，需完成 FixedPointIteration.m, g2.m, g3.m, g4.m, g5.m
五個檔案

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 HW03