1. 目標函數的一次與二次微分 (請參考 ceiba 上的講義)，即 f ′ (xn 和 f ′′(xn

f(x) = 5x^5 − 3x + 6

f ′ (xn = 25x^4 -3

f ′′(xn = 100x^3

1. 藉由牛頓法，找出當 −2 ≤ X ≤ 2 時函數的根與極值，若根或極值有兩個，就寫兩個，以此類推。

遞迴10次之結果:

|  |  |  |
| --- | --- | --- |
| 起始值 | 根 | 極值 |
| -3 | -1.134667304706167 | -0.588566191276543 |
| -2 | -1.134667304706167 | -0.588566191276542 |
| -1 | -1.134667304706167 | -0.588566191276542 |
| 0 | 未收斂 | NAN |
| 1 | -1.134674568038874 | 0.588566191276542 |
| 2 | 未收斂 | 0.588566191276542 |
| 3 | 未收斂 | 0.588566191276543 |

根: -1.134667304706167…

極值:

1.) -0.588566191276542…

2.) 0.588566191276542…

…

(程式碼請 見下頁)

1. Matlab 程式碼

function fv=ex2(a,n)

record = ones(n+1,7)\*-9999;

record(1,1) = 0;

record(1,2) = a;

record(1,5) = a;

for i=1:1:n

a1 = record(i,2);

a2 = record(i,5);

fn = 5\*a1.^5-3\*a1+6;

fnd = 25\*a1.^4-3;

fndopt = 25\*a2.^4-3;

fnd2opt = 100\*a2.^3;

nx=record(i,2)-fn/fnd;

nx2=record(i,5)-fndopt/fnd2opt;

record(i+1,1)=i;

record(i+1,2)=nx;

record(i+1,3)=fn;

record(i+1,4)=fnd;

record(i+1,5)=nx2;

record(i+1,6)=fndopt;

record(i+1,7)=fnd2opt;

end

save record;

fv=record;

end