**Project 1: Golden-Section Method**

(30pts) 1. We have an inline function:

f = inline('-x^2 + (20\*cos(pi/100\*t)+20)\*x - (10 + 10\*cos(pi/100\*t))^2 + 5\*sin(pi/100\*t) + 5', 'x','t'); for a given t, implement the golden-section method to calculate the **maximum** f(x) at the interval [-10, 30]; the function should receive five parameters: *xlow*, *xhigh*, *es*, *f* and *t*, and return three values: *xm, f*(*xm*) and *iter*. The definitions of these variables are shown as follows:

function [output] = GoldenMethod(xlow, xhigh, es, f, t)

% input:

% [xlow, xhigh]: initial range

% es: expected tolerance, length of bracket

% f: the inline function

% t: the parameter of f

% output:

% output = [xm, f(xm), iter]

% xm: the x value when f(x) is maximum

% iter: the number of iterations

%-----Please enter your codes below------

(15pts ) 2. Set the initial interval as [-10, 30], use your function to fill the following table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| t | Tolerance | xm | f(xm) | iter |
| 0 | 1e-9 | 20.0000 | 5.0000 | 51 |
| 50 | 1e-9 | 10.0000 | 10 | 51 |
| 75 | 1e-12 | 2.9289 | 8.5355 | 66 |
| 125 | 1e-15 | 2.9289 | 1.4645 | 79 |

(15pts) 3. Implement the fixed point method, set the shrinking ratio as 0.67, so you have to calculate both f(x1) and f(x2) during each iteration ([x1, x2] is the range after shrinking). Use the naïve method to fill the following table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| t | Tolerance | xm | f(xm) | iter |
| 0 | 1e-9 | 20.0000 | 5 | 61 |
| 20 | 1e-9 | 18.0902 | 7.9389 | 61 |
| 45 | 1e-12 | 11.5643 | 9.9384 | 79 |
| 60 | 1e-15 | 6.9098 | 9.7553 | 95 |

Also set the tolerance as 1e-9 and the initial interval is [-10, 30], for vector t = 0: 0.1: 150, Use both golden-section method and the fixed point method to calculate the maximum f(*xm*) and *xm* for each value of *t*.

(20pts) Compare the total calculation time (use commands *tic* and *toc* to get the calculation time) of these two methods and draw a curve of *t* versus f(*xm*).

|  |  |  |
| --- | --- | --- |
| Parameters | Golden method | Fixed point method |
| Total calculation time | 10.682481 | 25.171614 |

Please upload a report of **one page** and your function file (GoldenMethod.m).

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描述已自动生成

Golden Method Naïve Method

They are the same.