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MATH 446

Project 1: MATLAB code and Diary

type bisect.m

%Program 1.1 Bisection Method

%Computes approximate solution of f(x)=0

%Input: inline function f; a,b such that f(a)\*f(b)<0,

% and tolerance tol

%Output: Approximate solution xc

function xc = bisect(f,a,b,tol)

if sign(f(a))\*sign(f(b)) >= 0

error('f(a)f(b)<0 not satisfied!') %ceases execution

end

fa=f(a);

fb=f(b);

k = 0;

while (b-a)/2>tol

c=(a+b)/2;

fc=f(c);

if fc == 0 %c is a solution, done

break

end

if sign(fc)\*sign(fa)<0 %a and c make the new interval

b=c;fb=fc;

else %c and b make the new interval

a=c;fa=fc;

end

end

xc=(a+b)/2; %new midpoint is best estimate

format long

f=@(x) (8\*(cos(8\*x)^3))+(12\*(sin(8\*x)^2))+(96\*((cos(x)^4)+(sin(x)^2)-(7/8))\*cos(4\*x))-17

f =

@(x)(8\*(cos(8\*x)^3))+(12\*(sin(8\*x)^2))+(96\*((cos(x)^4)+(sin(x)^2)-(7/8))\*cos(4\*x))-17

xc=bisect(f,0,.5,.5e-10)

xc =

0.212640686688246

xc=bisect(f,0,.47,.5e-10)

xc =

0.212640686708619

xc=bisect(f,0,.43,.5e-10)

xc =

0.212640686693485

f(0.212640686688246)

ans =

1.802337834533319e-09

f=@(x) (8\*(cos(8\*x)^3))+(12\*(sin(8\*x)^2))+(96\*((cos(x)^4)+(sin(x)^2)-(7/8))\*cos(4\*x))-19

f =

@(x)(8\*(cos(8\*x)^3))+(12\*(sin(8\*x)^2))+(96\*((cos(x)^4)+(sin(x)^2)-(7/8))\*cos(4\*x))-19

xc=bisect(f,0,.5,.5e-10)

xc =

0.130898594856262

xc=bisect(f,0,.47,.5e-10)

xc =

0.130900192260742

xc=bisect(f,0,.43,.5e-10)

xc =

0.130901315212250

f(0.130898594856262)

ans =

1.421085471520200e-14

diary off