Yunus Güngör

BLG202E CRN:21843 Homework 1

Q1)a)

Q1)b)

>> syms x

>> syms h

>> f(x,h)=(sin(x+h)-sin(x))/h;

>> f(1.2,10^-20)

ans = 100000000000000000000\*sin(120000000000000000001/100000000000000000000) - 100000000000000000000\*sin(6/5)

>> 100000000000000000000\*sin (120000000000000000001/100000000000000000000) - 100000000000000000000\*sin(6/5)

ans = 0

a cancellation error accured. To solve this replace with .

Apllying in matlab:

>> syms x

>> syms h

>> f(x,h)=(2\*(cos((2\*x+h)/2)\*sin(h/2)))/h;

>> for k=1:20

vpa(f(1.2,10^-k)) % vpa is added to get floating point solutions

end

ans =

0.31519099449966615031214194544729

ans =

0.35769155861595837463304530487792

ans =

0.36189167457956886528662648175299

ans =

0.36231115191848446079030103760661

ans =

0.36235309427520448443367255697478

ans =

0.36235728845707020110495403989453

ans =

0.36235770787471867534750391262261

ans =

0.36235774981647814176294573816281

ans =

0.3623577540106540345943672217474

ans =

0.36235775443007162333940810854881

ans =

0.36235775447201338220853118457882

ans =

0.36235775447620755809538968205528

ans =

0.36235775447662697568407499370166

ans =

0.36235775447666891744294351948529

ans =

0.36235775447667311161883037200984

ans =

0.36235775447667353103641905726176

ans =

0.36235775447667357297817792578694

ans =

0.36235775447667357717235381263946

ans =

0.36235775447667357759177140132471

ans =

0.36235775447667357763371316019324

>> cos(1.2)

ans =

0.362357754476674

Cancellation error is dismissed.

Q2)

Polynomial of degree is:

Nested form:

There is times multiplication and times addition which means to calculate that operations needs to be done. And because of the multiplications process has complexity.

Q3)

can be represented as:

Since there is infinite negative power of every integer base in this representation, therefore there can’t be an exact representation of in any integer base because of the round off error or the choping error.

It also applies for , in every representation of there is an infinite multiplication which means that there is infinite power of every integer therefore it can’t be represented exactly in an integer base because of the round off error or the choping error.

Q4)a)

As a fixed point. which means

We can split this equation as fixed points are

b)

It can be said that if converges at .

will converge to when applied fixed point iteration for the start point which is between and .

c) If we want to reduce error by a power of ten, we want to find such as which means since

it will take about iterations to reduce error by 0.1.

Q5)a)

To solve this, we need to use a while loop in matlab:

>> syms n

>> g(n)=40\*(n^1.5)-875\*n+35000;

>> f(n)=n-((40\*(n^1.5)-875\*n+35000)/(60\*(n^(1/2))-875));

>> m=vpa(f(150)); % n0 is 150 and n1 is m

>> while (abs(m-f(m))>0.01)

m=vpa(f(m));

end

>> m

m =

62.69170788155414504553770777445 + 0.0000019446316049404927784201758057176\*I

>> solve(g,n);

>> abs(vpa(ans)-m)

ans =

321.33056947116202560537061536855

0.000010905119622461789861727660713476

There is two roots and we found one of them which is close to 63 with Newton-Raphson Method.