PROBLEM SET 2, MATH 128A

PROBLEM 6:

newton(2, a, 0, 0)

numCorrectBits =

-8.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

-1.600000000000000e+01 + 4.000000000000000e+00i

numCorrectBits =

-42

numCorrectBits =

-33

numCorrectBits =

-33

ans =

1.895494267033981e+00 4.000000000000000e+00

x = fsolve(@(t) 2\*sin(t) - t,2) - newton(2, a, 0, 0)

numCorrectBits =

-8.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

-1.600000000000000e+01 + 4.000000000000000e+00i

numCorrectBits =

-42

numCorrectBits =

-33

numCorrectBits =

-33

x =

1.749964617658861e-10 -2.104505732791023e+00

x / fsolve(@(t) 2\*sin(t) - t,2)

ans =

9.232233765790274e-11 -1.110267527155228e+00

newton(2, b, 0, 0)

numCorrectBits =

0

numCorrectBits =

-4

numCorrectBits =

-12

numCorrectBits =

-27

numCorrectBits =

-3.100000000000000e+01 + 4.000000000000000e+00i

numCorrectBits =

-3.100000000000000e+01 + 4.000000000000000e+00i

ans =

6.305395279271693e+00 5.000000000000000e+00

x = fsolve(@(t) 1/t + log(t) - 2,2) - newton(2, b, 0, 0)

numCorrectBits =

0

numCorrectBits =

-4

numCorrectBits =

-12

numCorrectBits =

-27

numCorrectBits =

-3.100000000000000e+01 + 4.000000000000000e+00i

numCorrectBits =

-3.100000000000000e+01 + 4.000000000000000e+00i

x =

-9.022489422250146e-10 1.305395278369444e+00

x / fsolve(@(t) 1/t + log(t) - 2,2)

ans =

-1.430915751341022e-10 2.070283020713358e-01

newton(0.3, b, 0, 0)

numCorrectBits =

2

numCorrectBits =

2

numCorrectBits =

2

numCorrectBits =

2

numCorrectBits =

2

ans =

3.178444328993727e-01 4.000000000000000e+00

x = fsolve(@(t) 1/t + log(t) - 2,0.3) - newton(0.3, b, 0, 0)

numCorrectBits =

2

numCorrectBits =

2

numCorrectBits =

2

numCorrectBits =

2

numCorrectBits =

2

x =

-1.254578663179018e-10 -3.682155567226085e+00

x / fsolve(@(t) 1/t + log(t) - 2, 0.3)

ans =

-3.947146886387056e-10 -1.158477288744972e+01

newton(eps, c, 0, 0)

numCorrectBits =

-5

numCorrectBits =

-5

ans =

1.094764425253764e-47 2.660000000000000e+02

x = eps^3 - newton(eps, c, 0, 0)

numCorrectBits =

-5

numCorrectBits =

-5

numCorrectBits =

-5

numCorrectBits =

-5

numCorrectBits =

-5

x =

-2.430865342914508e-63 -2.660000000000000e+02

x / eps^3

ans =

-2.220446049250313e-16 -2.429746472062626e+49

newton(eps, d, 0, 0)

numCorrectBits =

-31

numCorrectBits =

-31

ans =

4.930380657631324e-32 1.000000000000000e+00

newton(1, d, 0, 0)

numCorrectBits =

-1

numCorrectBits =

-4.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

-10

numCorrectBits =

-47

numCorrectBits =

-31

numCorrectBits =

-31

numCorrectBits =

-31

ans =

4.930380657631324e-32 6.000000000000000e+00

newton(2, d, 0, 0)

numCorrectBits =

1

numCorrectBits =

3.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

8

numCorrectBits =

1.600000000000000e+01 + 4.000000000000000e+00i

numCorrectBits =

34

numCorrectBits =

6.900000000000000e+01 + 4.000000000000000e+00i

numCorrectBits =

139

numCorrectBits =

2.800000000000000e+02 + 4.000000000000000e+00i

numCorrectBits =

560

numCorrectBits =

Inf + 4.000000000000000e+00i

numCorrectBits =

NaN

numCorrectBits =

NaN

newton(1.39, d, 0, 0)

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

-1.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

-2

numCorrectBits =

-5.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

-14

numCorrectBits =

-31

numCorrectBits =

-31

numCorrectBits =

-31

numCorrectBits =

-31

ans =

4.930380657631324e-32 1.200000000000000e+01

newton(1.3917, d, 0, 0)

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

-1.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

-2

numCorrectBits =

-6.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

-18

numCorrectBits =

-31

numCorrectBits =

-31

numCorrectBits =

-31

ans =

4.930380657631324e-32 1.500000000000000e+01

newton(-1.3918, d, 0, 0)

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

1

numCorrectBits =

2.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

5

numCorrectBits =

1.200000000000000e+01 + 4.000000000000000e+00i

numCorrectBits =

25

numCorrectBits =

5.100000000000000e+01 + 4.000000000000000e+00i

numCorrectBits =

103

numCorrectBits =

2.080000000000000e+02 + 4.000000000000000e+00i

numCorrectBits =

417

numCorrectBits =

8.350000000000000e+02 + 4.000000000000000e+00i

numCorrectBits =

Inf

numCorrectBits =

NaN

numCorrectBits =

NaN

numCorrectBits =

NaN

newton(0, d, 0, 0)

numCorrectBits =

-31

numCorrectBits =

-31

ans =

4.930380657631324e-32 1.000000000000000e+00

newton(-1.39, d, 0, 0)

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

-1

numCorrectBits =

-2.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

-5

numCorrectBits =

-1.400000000000000e+01 + 4.000000000000000e+00i

numCorrectBits =

-31

numCorrectBits =

-31

numCorrectBits =

-31

numCorrectBits =

-31

ans =

4.930380657631324e-32 1.200000000000000e+01

newton(-1.3917, d, 0, 0)

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

-1

numCorrectBits =

-2.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

-6

numCorrectBits =

-1.800000000000000e+01 + 4.000000000000000e+00i

numCorrectBits =

-31

numCorrectBits =

-31

numCorrectBits =

-31

ans =

4.930380657631324e-32 1.500000000000000e+01

newton(-1.3918, d, 0, 0)

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

0

numCorrectBits =

0.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

1

numCorrectBits =

2.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

5

numCorrectBits =

1.200000000000000e+01 + 4.000000000000000e+00i

numCorrectBits =

25

numCorrectBits =

5.100000000000000e+01 + 4.000000000000000e+00i

numCorrectBits =

103

numCorrectBits =

2.080000000000000e+02 + 4.000000000000000e+00i

numCorrectBits =

417

numCorrectBits =

8.350000000000000e+02 + 4.000000000000000e+00i

numCorrectBits =

Inf

numCorrectBits =

NaN

numCorrectBits =

NaN

x = eps^2 - newton(1, d, 0, 0)

numCorrectBits =

-1

numCorrectBits =

-4.000000000000000e+00 + 4.000000000000000e+00i

numCorrectBits =

-10

numCorrectBits =

-47

numCorrectBits =

-31

numCorrectBits =

-31

numCorrectBits =

-31

x =

0 -6

#########################

#### FUNCTIONS ####

#########################

function r = newton(x0, f, p, n)

options = optimset('Display','off');

func = f{1};

deriv = f{2};

temp = x0 - (func(x0)/deriv(x0));

numCorrectBits = floor(log2(fsolve(func, 2, options) - temp))

steps = [temp, n];

%if abs(x0 - temp) <= eps^3

% r = [temp, n];

% r = temp;

if n > 1000

r = 'oscilate';

elseif x0 == temp

r = [temp, n];

%r = temp;

else

r = newton(temp, f, p, n+1);

end

function result = a()

result = cell(2,1);

result{1} = @(t) 2\*sin(t) - t;

result{2} = @(t) 2\*cos(t) - 1;

function result = b()

result = cell(2,1);

result{1} = @(t) 1/t + log(t) - 2;

result{2} = @(t) -1 / (t^2) + 1/t;

function result = c()

result = cell(2,1);

result{1} = @(t) (t - eps^3)^3;

result{2} = @(t) 3\*(t - eps^3)^2;

function result = d()

result = cell(2,1);

result{1} = @(t) atan(t - eps^2);

result{2} = @(t) 1 / (1 + (t - eps^2)^2);