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Numerical Computing Lab Session 1:

Task 1(If more than one root kindly mention all values)

Function	Root (by visualization)
1) $f(x)=cos(x)-1.3x$	0.7
2) $f(x)=xcos(x)-2x2+3x-1$	0.4, 1.7
3) $f(x)=2xcos(2x)-(x+1)2$	-2.4, -0.8

Task 2 (Bisection Method)

1) $f(x)=cos(x)-1.3x$

Tol	No. of Iterations	Interval	Root
0.001	8	0.617188, 0.625	0.623047
0.00001	15	0.624146, 1	0.624207

Repeat the process by selecting another interval

Tol	No. of Iterations	Interval	Root
0.001	1	-2,2	0
0.00001	17	0.624146, 0.624207	0.624207

2) f(x)=xcos(x)−2x2+3x−1

Tol	No. of Iterations	Interval	Root
0.001	1	0,1	`0.5`
0.00001	15	0.297485,	0.297546

		0.297546	

Repeat the process by selecting another interval

Tol	No. of Iterations	Interval	Root
0.001	1	0,0.5	0.25
0.00001	14	0.297485, 0.297546	0.297546

3) $f(x)=2x\cos(2x)-(x+1)2$

Tol	No. of Iterations	Interval	Root
0.001	1	-1,1	0
0.00001	16	-0.798218, -0.798157	-0.798157

Repeat the process by selecting another interval

Tol	No. of Iterations	Interval	Root
0.001	1	-1,2	0.5
0.00001	16	-0.798218, -0.798126	-0.798126

Write your Observations:

All initial intervals are not working on every function, Bisection Method is taking many iteration to make the error lesser.

Task 3 (Newton Raphson Method)

1) $f(x)=cos(x)-1.3x$

Tol	No. of Iterations	Starting Point	Root
0.001	1	1	0.645245
0.00001	3	1	0.624185

Repeat the process by selecting another interval

Tol	No. of Iterations	Starting Point	Root
0.001	1	2	0.634794
0.00001	3	2	0.624185

2) $f(x)=xcos(x)-2x^2+3x-1$

Tol	No. of Iterations	Starting Point	Root
0.001	1	1	1.41524
0.00001	5	1	1.25662

Repeat the process by selecting another interval

Tol	No. of Iterations	Starting Point	Root
0.001	1	2	1.47029
0.00001	5	2	1.25662

3) $f(x)=2xcos(2x)-(x+1)^2$

Tol	No. of Iterations	Starting Point	Root
0.001	1	1	1.06379
0.00001	20	1	1.25645

Repeat the process by selecting another interval

Tol	No. of Iterations	Starting Point	Root
0.001	1	0.7	0.812623
0.00001	23	0.7	1.25644

Write your Observations:

New raphson method is very precise and take less iteration

to give minimum errored value.

Task 4:

Function	Root (by fsolve)
$f1(x)=cos(x)-1.3x$	0.58
$f2(x)=xcos(x)-2x2+3x-1$	0.31, 1.25
$f3(x)=2xcos(2x)-(x+1)2$	-2.19131, -0.79816