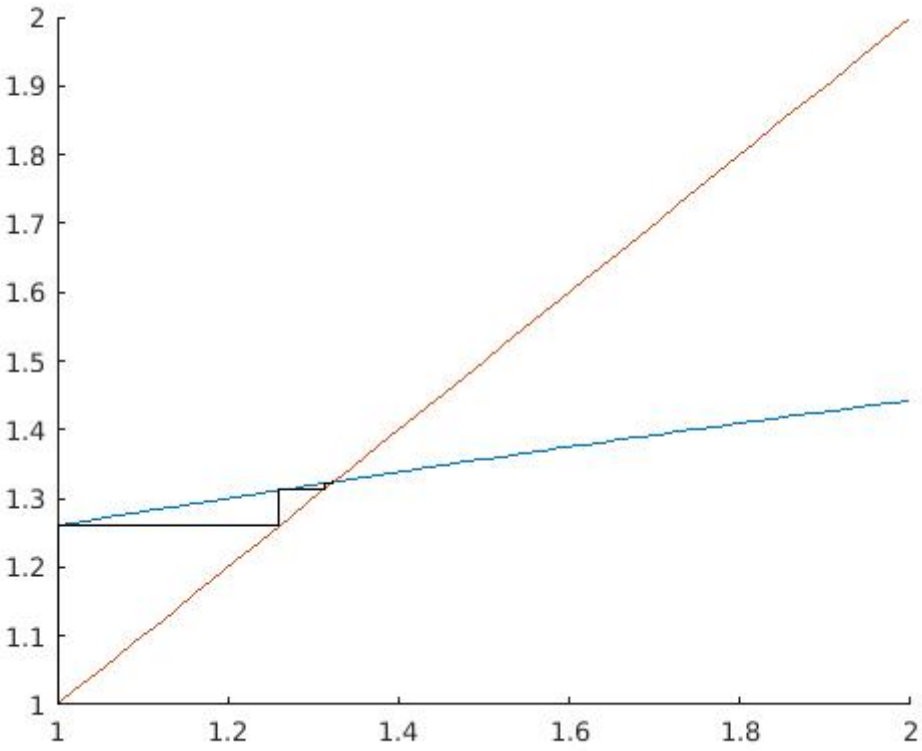
Lab 2

Problem 1: The table is as follows:

TABLE

n	x_n	f(x_n)
1	1.000000	-1.000000
2	1.259921	-0.259921
3	1.312294	-0.052373
4	1.322354	-0.010060
5	1.324269	-0.001915

Fixed point iteration plot is:



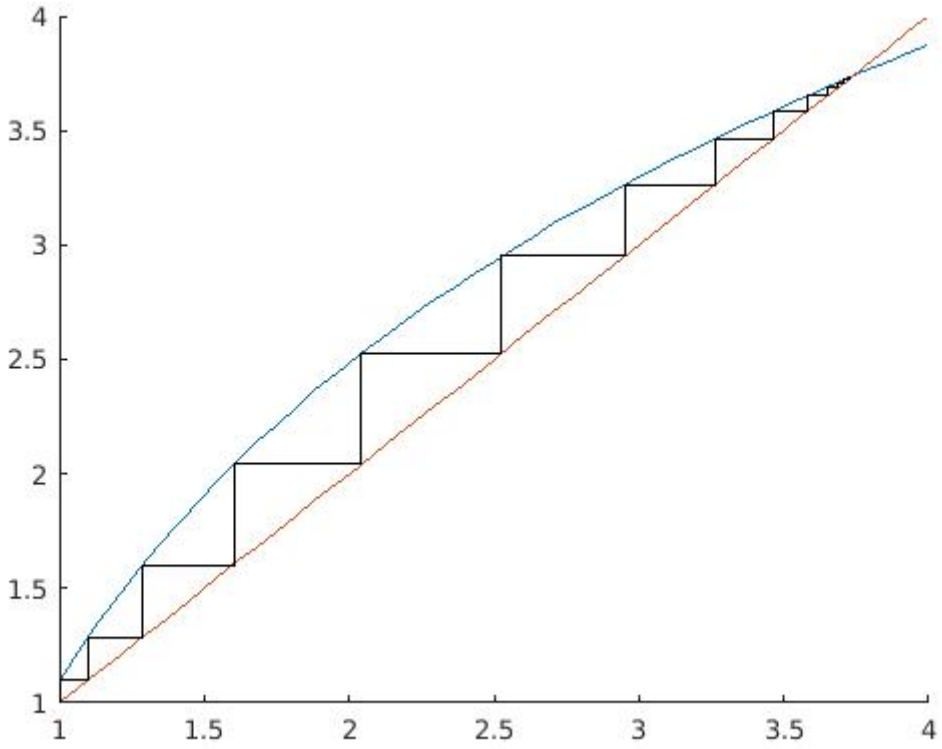
Problem 2:

1) The table is as follows:

TABLE

n	x_n	f(x_n)
1	1.000000	0.281718
2	1.098612	0.620847
3	1.286708	1.346005
4	1.602786	2.739919
5	2.042099	4.803738
6	2.526569	6.640144
7	2.952337	6.998225
8	3.263806	5.808416
9	3.464400	4.048917
10	3.583691	2.522322
11	3.651399	1.469613
12	3.688833	0.824323
13	3.709233	0.452751
14	3.720262	0.245835
15	3.726201	0.132659
16	3.729391	0.071347
17	3.731102	0.038304
18	3.732020	0.020544
19	3.732511	0.011013
20	3.732775	0.005902
21	3.732916	0.003163
22	3.732992	0.001695
23	3.733032	0.000908

Fixed point iteration plot is:



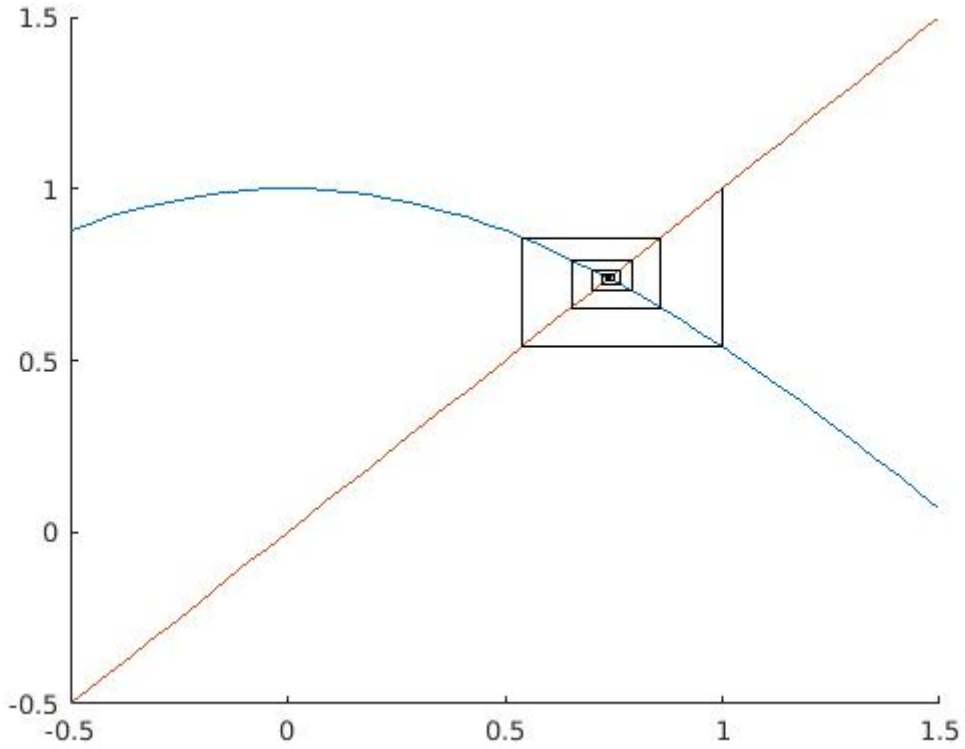
2) The table is :

TABLE

n	x_n	f(x_n)
1	1.000000	0.459698
2	0.540302	-0.317251
3	0.857553	0.203263
4	0.654290	-0.139191
5	0.793480	0.092112
6	0.701369	-0.062591
7	0.763960	0.041857
8	0.722102	-0.028315
9	0.750418	0.019014
10	0.731404	-0.012833
11	0.744237	0.008633
12	0.735605	-0.005820
13	0.741425	0.003918

14	0.737507	-0.002640
15	0.740147	0.001778
16	0.738369	-0.001198
17	0.739567	0.000807

Fixed point iteration plot is :



Problem 3:

a) It keeps toggling between -1 and 0 for initial value 1 and blows up for intial value 2.

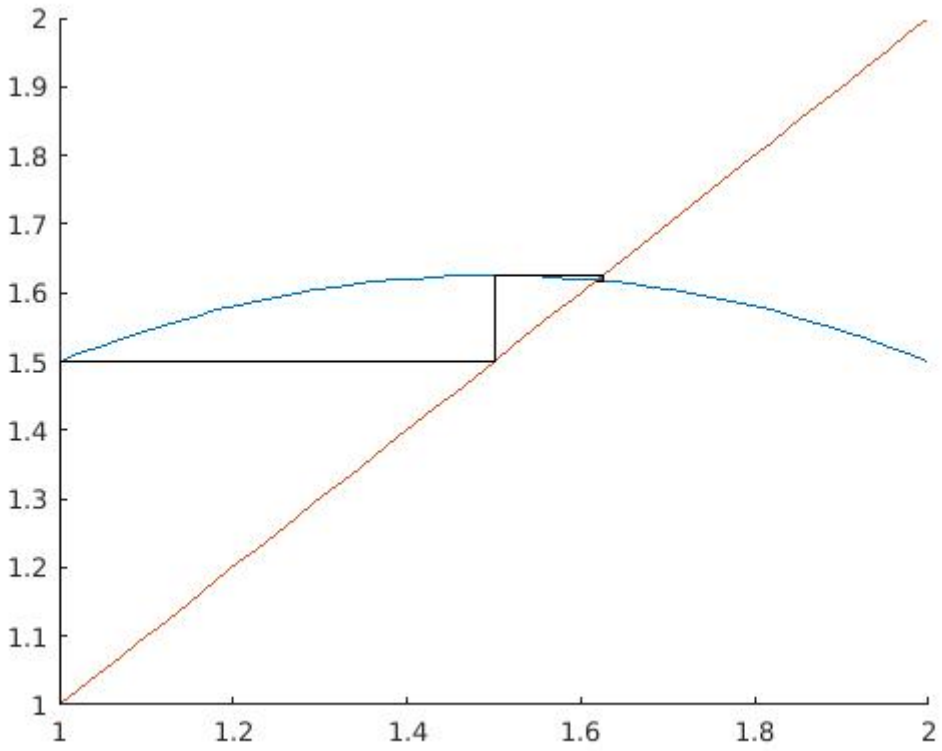
b) It keeps toggling between 1 and 2 for initial value 1 and 2 both.

c)The table for initial value 1 is:

TABLE

n	x_n	f(x_n)
1	1.000000	-1.000000
2	1.500000	-0.250000
3	1.625000	0.015625
4	1.617188	-0.001892

Fixed point iteration plot is:

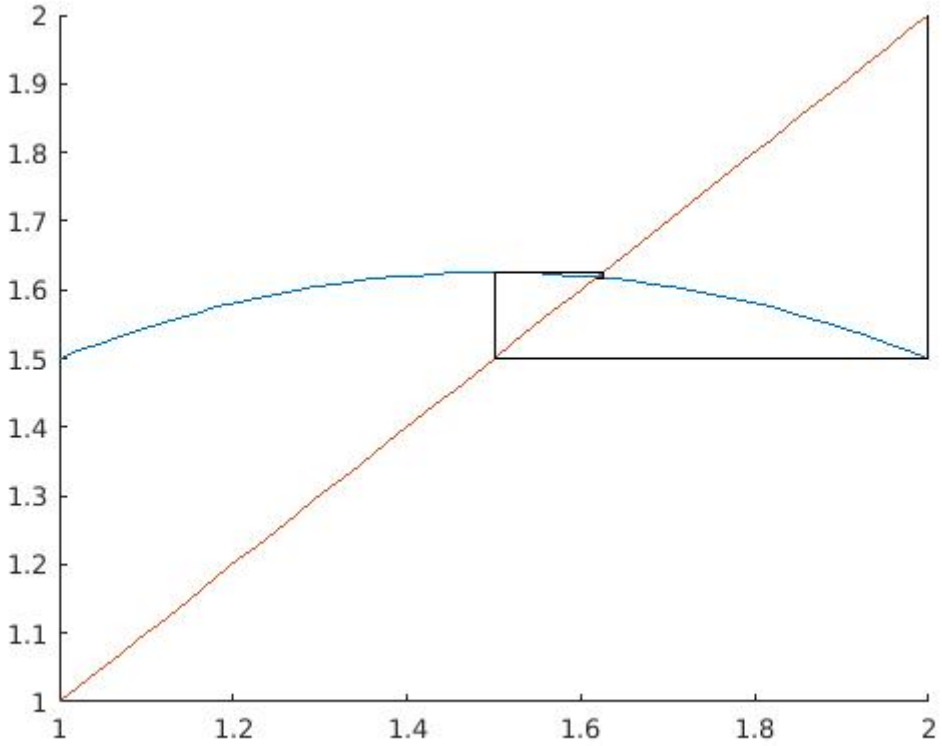


The table for initial value 2 is:

TABLE

n	x_n	f(x_n)
1	2.000000	1.000000
2	1.500000	-0.250000
3	1.625000	0.015625
4	1.617188	-0.001892

Fixed point iteration plot is:



Problem 4: For initial value -0.8, the table is:

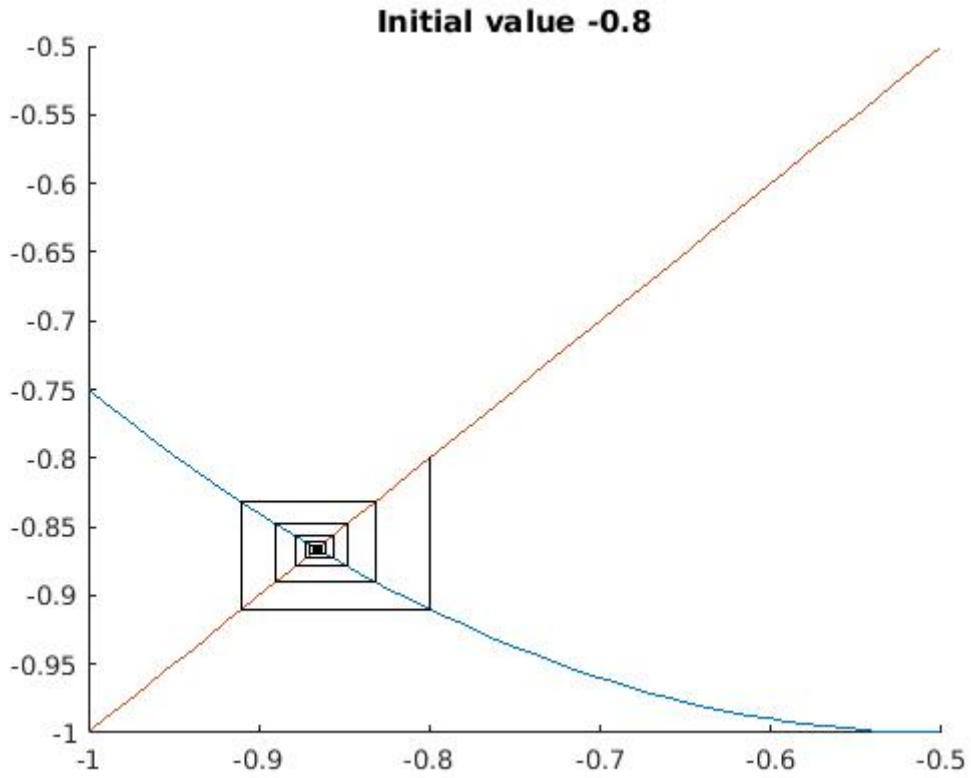
TABLE

n	x_n	f(x_n)
1	-0.800000	-0.110000
2	-0.910000	0.078100
3	-0.831900	-0.057942
4	-0.889842	0.041819
5	-0.848023	-0.030857
6	-0.878880	0.022430
7	-0.856450	-0.016494
8	-0.872943	0.012030
9	-0.860913	-0.008829
10	-0.869742	0.006451
11	-0.863291	-0.004728
12	-0.868020	0.003458

13	-0.864562	-0.002533
14	-0.867095	0.001853
15	-0.865241	-0.001357
16	-0.866599	0.000993

With initial value -0.8 solution is = -0.8666.

Fixed point iteration plot is :



For initial value 0.8, the table is:

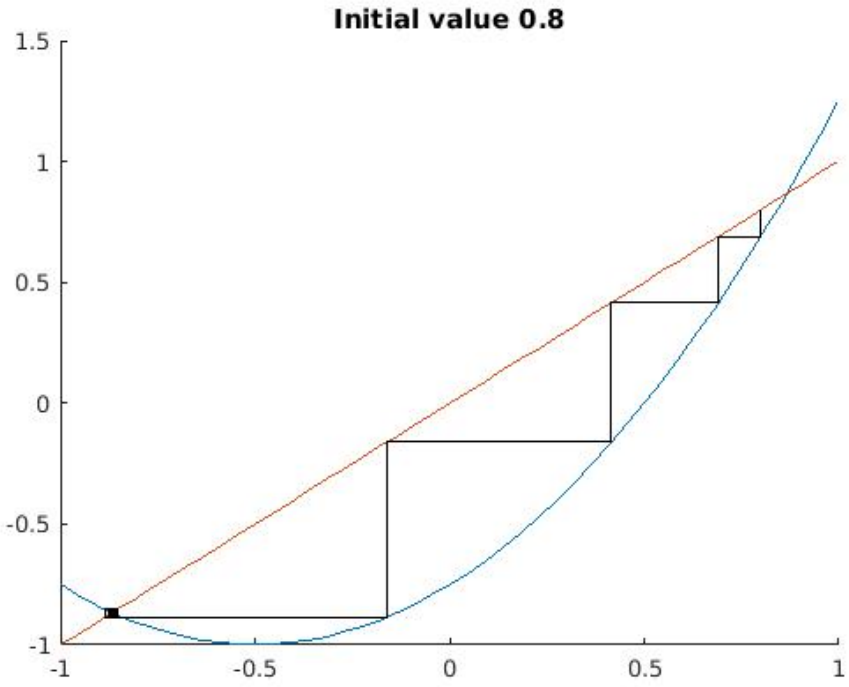
TABLE

n	x_n	f(x_n)
1	0.800000	-0.110000
2	0.690000	-0.273900
3	0.416100	-0.576861
4	-0.160761	-0.724156
5	-0.884917	0.033078
6	-0.851839	-0.024370

7	-0.876209	0.017743
8	-0.858467	-0.013035
9	-0.871502	0.009515
10	-0.861986	-0.006979
11	-0.868966	0.005102
12	-0.863864	-0.003739
13	-0.867603	0.002735
14	-0.864868	-0.002003
15	-0.866871	0.001466
16	-0.865406	-0.001073
17	-0.866479	0.000786

With initial value 0.8 solution is = -0.86648.

Fixed point iteration plot is :



Problem 5:

a) The table is:

TABLE

n	x_n	f(x_n)
1	1.000000	-2.000000
1	1.000000	-1.472000
1	1.000000	-0.656000
4	1.524956	0.021316
5	1.521356	-0.000140

Therefore a root is 1.521356.

b) The table is:

TABLE

n	x_n	f(x_n)
1	1.500000	-10.101420
1	1.500000	-1.997884
1	1.500000	-0.002102
4	1.300200	-0.004498
5	1.150346	1.064119
6	0.930870	1.518429
7	0.630451	1.531096
8	0.132204	1.131429
9	-0.449773	0.583229
10	-0.986447	0.539045
11	-0.771678	-0.166234
12	-1.029404	-0.272474
13	-0.911837	0.075303
14	-0.923880	0.004249
15	-0.924592	-0.000036

A root is -0.9246 + 0.4371i.

Problem 6:

a) The root near x = 1 is 1.2411 and near x=-2 is -2.211.

The table is:

TABLE

n	x_n	f(x_n)
1	-1.200000	-3.258806
1	-1.200000	-3.037468
1	-1.200000	-2.793403
4	1.652925	2.954398
5	1.123168	-0.663917
6	1.233672	-0.044238
7	1.241105	-0.000225

b) The table is:

TABLE

n	x_n	f(x_n)
1	1.500000	1.252505
1	1.500000	0.974550
1	1.500000	0.726442
4	0.870311	-0.007088
5	0.876821	0.000106

The root near x=0.9 is 0.876821.

Problem 7:

a) The table is:

TABLE

n	x_n	f(x_n)
1	-1.000000	3.000000
1	-1.000000	32.000000
1	-1.000000	135.000000
4	-1.337054	8.048068
5	-1.274211	3.956665
6	-1.117273	0.924236
7	-1.012587	0.064272
8	-1.000454	-0.000577

9	-1.000001	-0.000005

The root is -1.0000 – 1.0000i.

b) The table is:

TABLE

n	x_n	f(x_n)
1	1.500000	-2.981689
1	1.500000	-2.655200
1	1.500000	-2.369297
4	0.645558	-0.598963
5	0.429558	-0.205897
6	0.336105	-0.029623
7	0.318660	-0.000381
8	0.318132	-0.000000

The root is 0.3181 – 1.3372i.