
CS 374 : COMPUTATIONAL AND NUMERICAL METHODS

SET 4

THE BISECTION METHOD

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1 $f(x) = x^6 - x - 1$

1.1 Plots

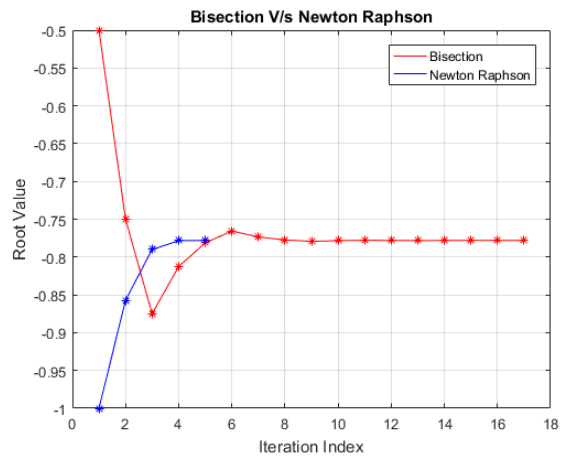
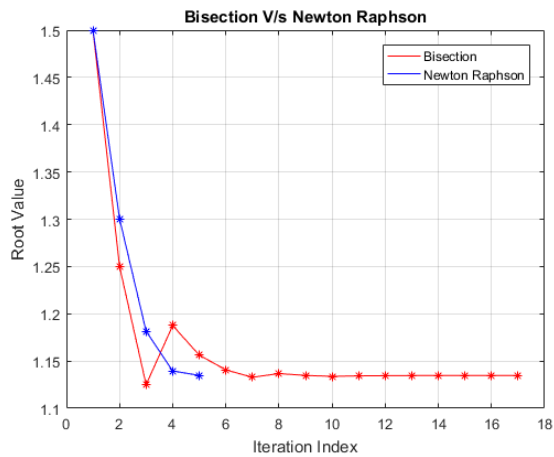


Figure 1: Fig 1.1 : Positive root of $x^6 - x - 1 = 0$ || Fig 1.2: Negative root of $x^6 - x - 1 = 0$

1.2 Tables

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	1.5	8.8906	44.563	1.3005	-0.1995
2	1.3005	2.5373	21.32	1.1815	-0.119
3	1.1815	0.5385	12.813	1.1395	-0.042
4	1.1395	0.0492	10.525	1.1348	-0.0047
5	1.1348	0.0006	10.29	1.1347	-0.0001

Table 1: Positive Root of $x^6 - x - 1 = 0$

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	-1	1	-7	-0.8571	0.1429
2	-0.8571	0.2537	-3.776	-0.79	0.0672
3	-0.79	0.033	-2.8457	-0.7784	0.0116
4	-0.7784	0.0008	-2.7143	-0.7781	0.0003
5	-0.7781	0	-2.7112	-0.7781	0

Table 2: Positive Root of $x^6 - x - 1 = 0$

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

2.1 Plots

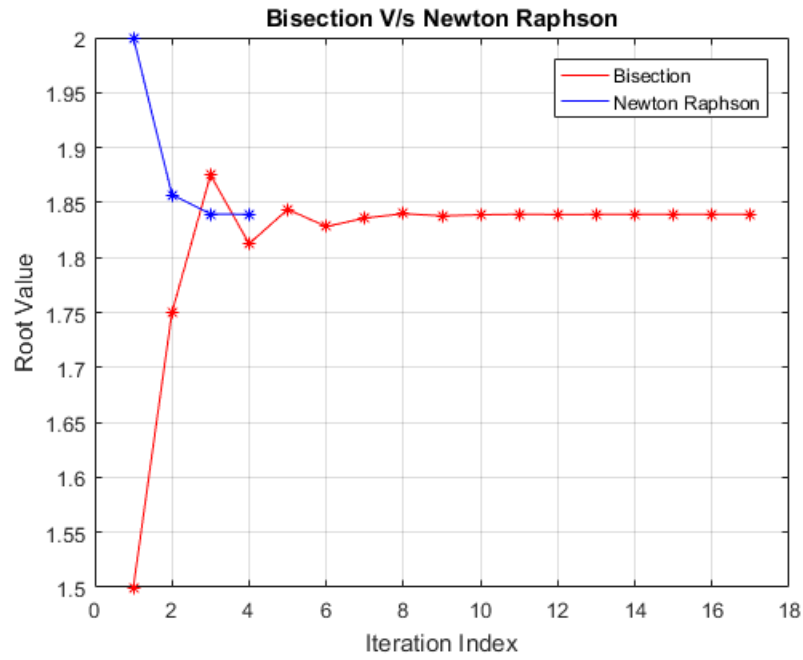


Figure 2: Positive root of $x^3 - x^2x - 1 = 0$

2.2 Tables

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	2	1	7	1.8571	-0.1429
2	1.8571	0.0991	5.6327	1.8395	-0.0176
3	1.8395	0.0014	5.4727	1.8393	-0.0003
4	1.8393	0	5.4704	1.8393	0

Table 3: Positive Root of $f(x) = x^3 - x^2 - x - 1$

3 $f(x) = 1 + 0.3\cos(x) - x$

3.1 Plots

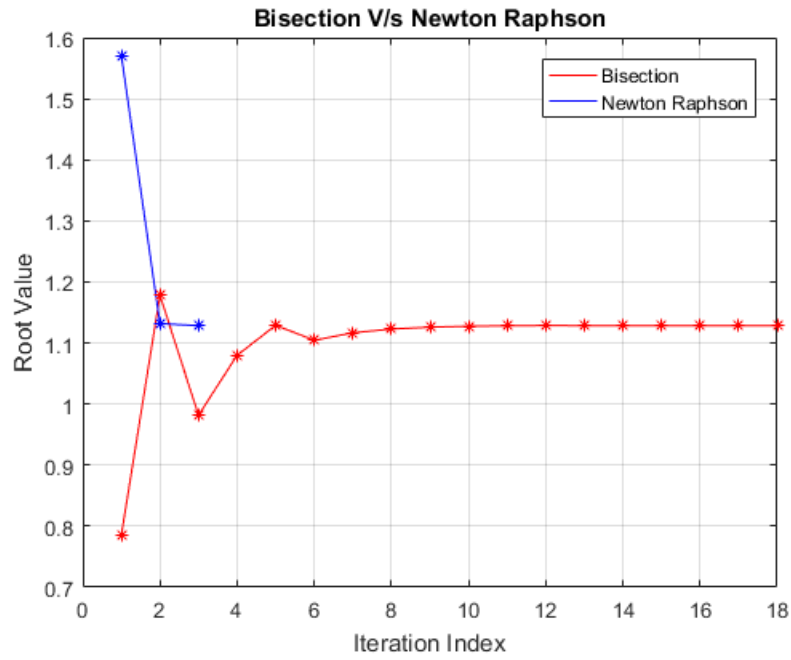


Figure 3: Positive root of $1 + 0.3\cos x - x$

3.2 Tables

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	1.5708	-0.5708	-1.3	1.1317	-0.4391
2	1.1317	-0.0042	-1.2715	1.1284	-0.0033
3	1.1284	0	-1.2711	1.1284	0

Table 4: Positive Root of $f(x) = 1 + 0.3\cos(x) - x$

4 $f(x) = 0.5 + \sin x - \cos x$

4.1 Plots

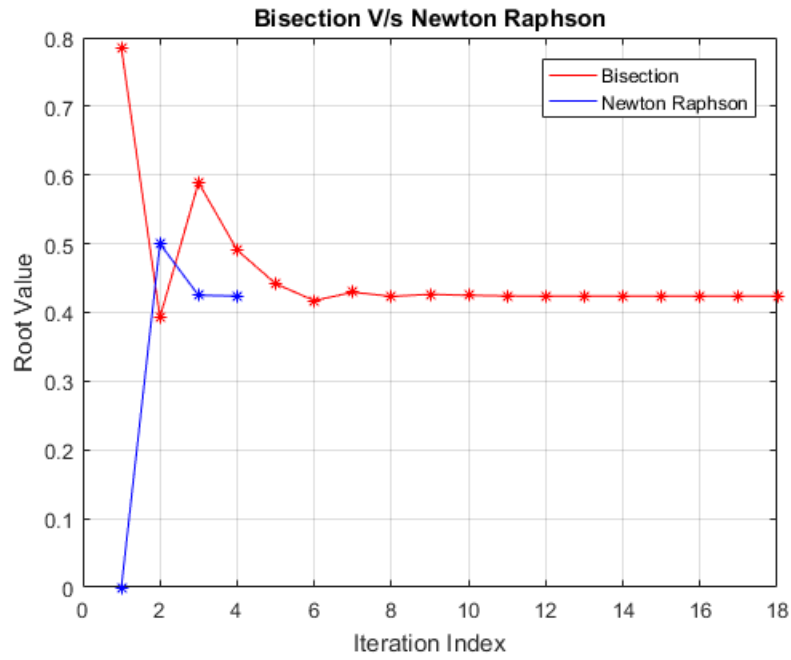


Figure 4: Positive root of $f(x) = 0.5 + \sin x - \cos x$

4.2 Tables

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	0	-0.5	1	0.5	0.5
2	0.5	0.1018	1.357	0.425	-0.075
3	0.425	0.0012	1.3233	0.424	-0.0009
4	0.424	0	1.3229	0.424	0

Table 5: Positive Root of $f(x) = 0.5 + \sin x - \cos x$

5 $f(x) = x - e^{-x}$

5.1 Plots

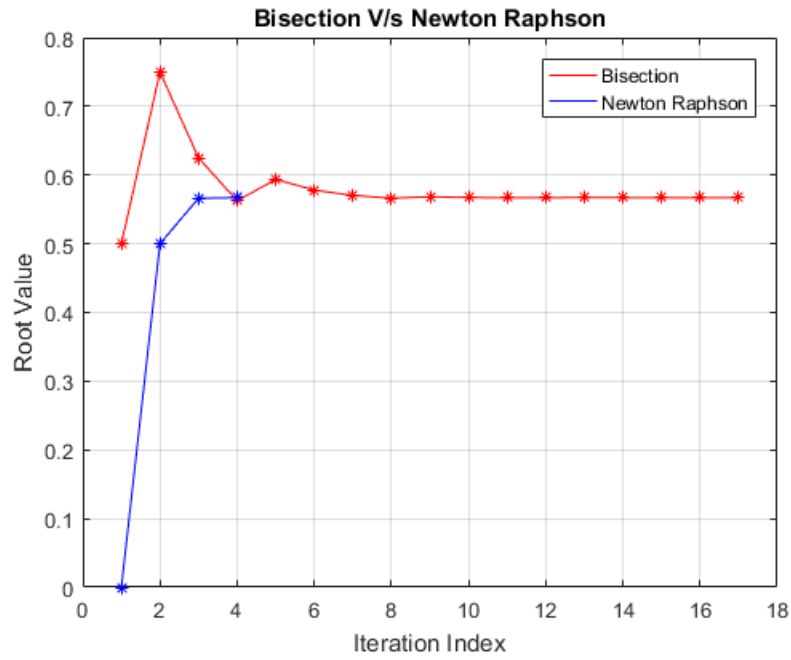


Figure 5: Positive root of $f(x) = x - e^{-x}$

5.2 Tables

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	0	1	-2	0.5	0.5
2	0.5	0.1065	-1.6065	0.5663	0.0663
3	0.5663	0.0013	-1.5676	0.5671	0.0008
4	0.5671	0	-1.5671	0.5671	0

Table 6: Positive Root of $f(x) = x - e^{-x}$

6 $f(x) = \sin x - e^{-x}$

6.1 Plots

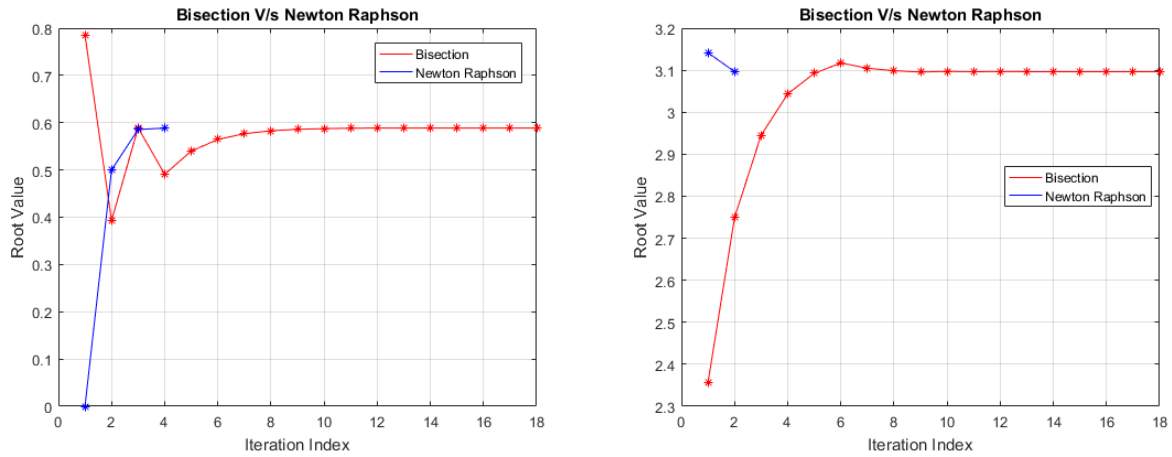


Figure 6: Fig 1.1 : Positive root of $x^6 - x - 1 = 0$ || Fig 1.2: Negative root of $x^6 - x - 1 = 0$

6.2 Tables

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	0	1	-2	0.5	0.5
2	0.5	0.1271	-1.4841	0.5856	0.0856
3	0.5856	0.004	-1.3901	0.5885	0.0029
4	0.5885	0	-1.3869	0.5885	0

Table 7: Positive Root of $f(x) = \sin x - e^{-x}$

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	3.1416	0.0432	0.9568	3.0964	-0.0452
2	3.0964	0.0001	0.9538	3.0964	-0.0001

Table 8: Positive Root of $f(x) = \sin x - e^{-x}$

7 $f(x) = x^3 - 2x - 2$

7.1 Plots

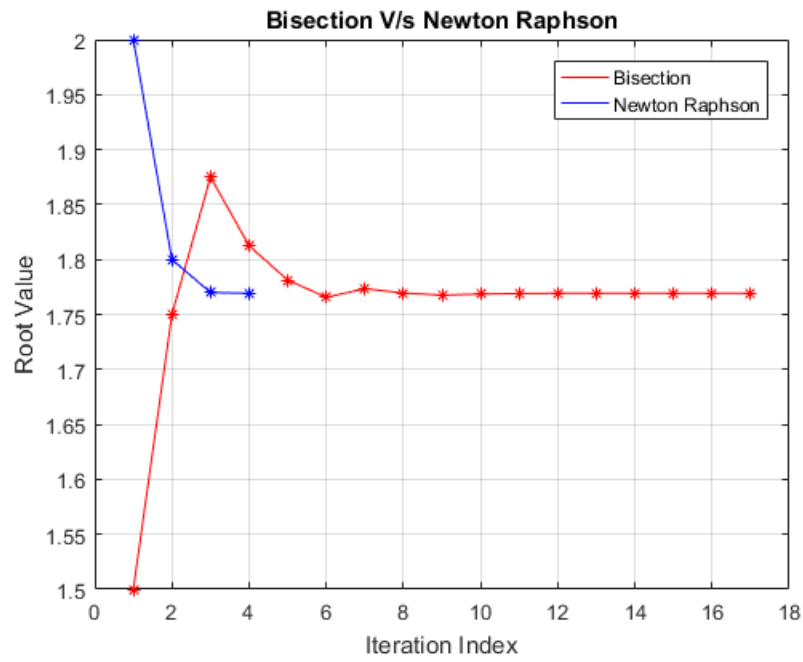


Figure 7: Positive root of $x^3 - 2x - 2 = 0$

7.2 Tables

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	2	2	10	1.8	-0.2
2	1.8	0.232	7.72	1.7699	-0.0301
3	1.7699	0.0048	7.3981	1.7693	-0.0007
4	1.7693	0	7.3912	1.7693	0

Table 9: Positive Root of $f(x) = x^3 - 2x - 2$

8 $f(x) = x^4 - x - 1$

8.1 Plots

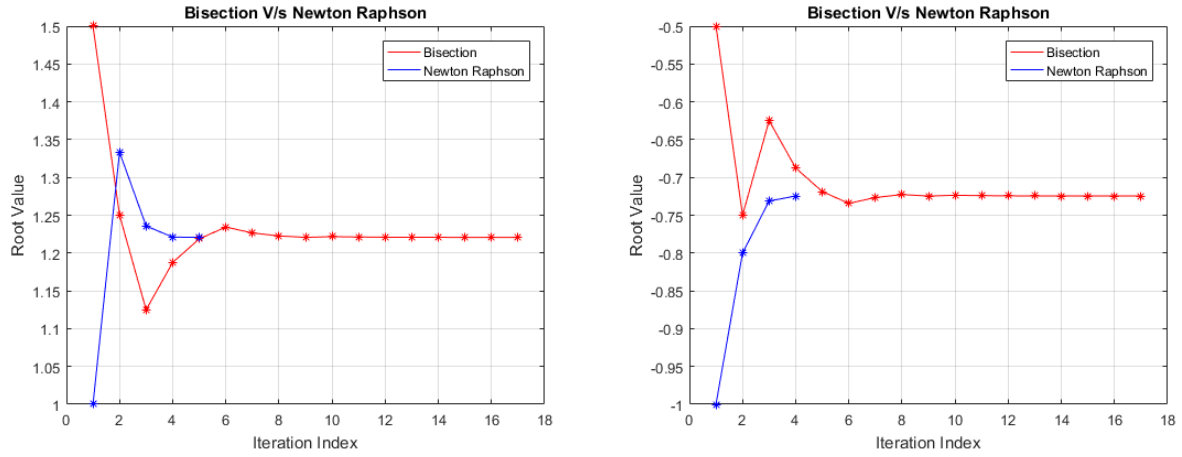


Figure 8: Roots of $x^4 - x - 1 = 0$

8.2 Tables

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	1	-1	3	1.3333	0.3333
2	1.3333	0.8272	8.4815	1.2358	-0.0975
3	1.2358	0.0966	6.5494	1.2211	-0.0147
4	1.2211	0.002	6.2823	1.2207	-0.0003
5	1.2207	0	6.2767	1.2207	0

Table 10: First Root of $f(x) = x^4 - x - 1$

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	-1	1	-5	-0.8	0.2
2	-0.8	0.2096	-3.048	-0.7312	0.0688
3	-0.7312	0.0171	-2.564	-0.7245	0.0067
4	-0.7245	0.0001	-2.5215	-0.7245	0.0001

Table 11: Second Root of $f(x) = x^4 - x - 1$

9 $f(x) = e^x - x - 2$

9.1 Plots

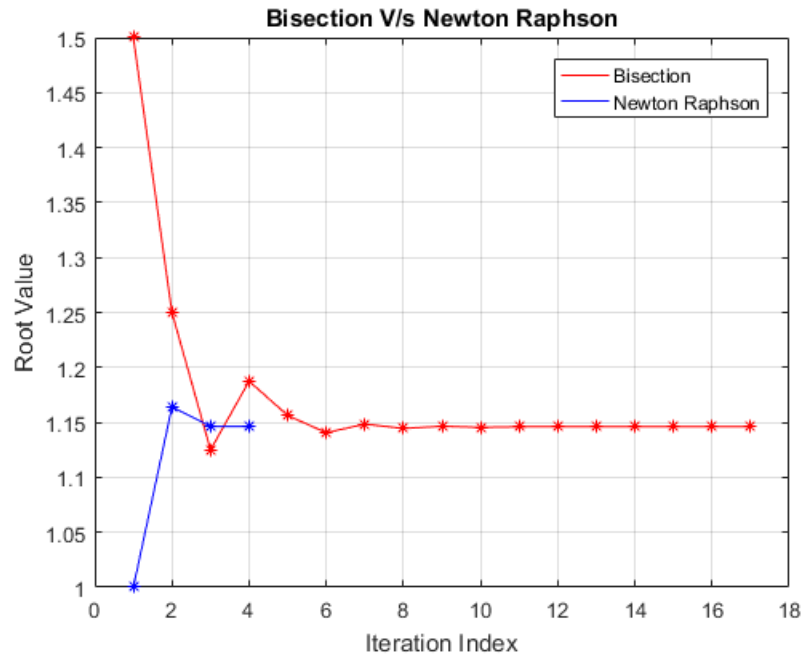


Figure 9: Positive root of $f(x) = e^x - x - 2$

9.2 Tables

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	1	-0.2817	1.7183	1.164	0.164
2	1.164	0.0386	2.2026	1.1464	-0.0175
3	1.1464	0.0005	2.1469	1.1462	-0.0002
4	1.1462	0	2.1462	1.1462	0

Table 12: Positive Root of $f(x) = e^x - x - 2$

10 $f(x) = 1 - x + \sin x$

10.1 Plots

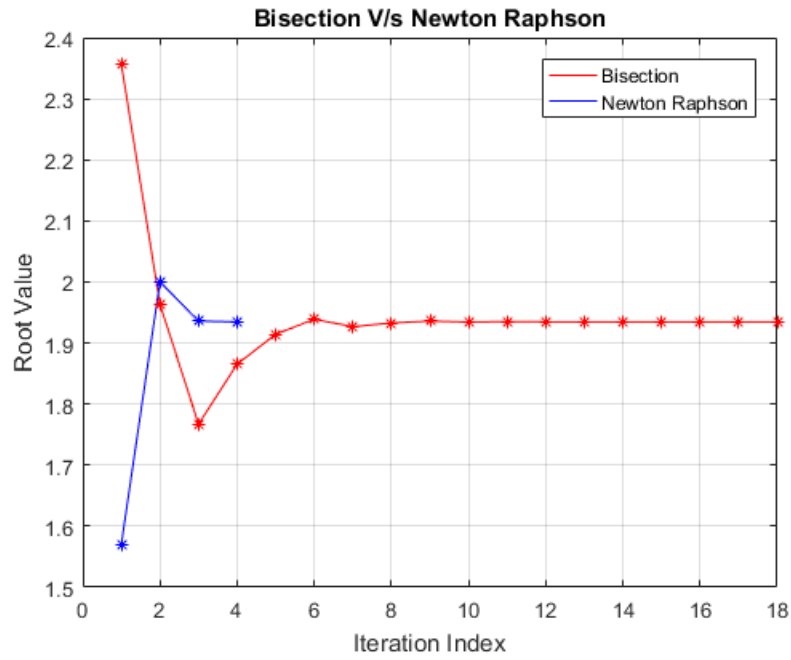


Figure 10: Positive root of $f(x) = 1 - x + \sin x$

10.2 Tables

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	1.5708	0.4292	-1	2	0.4292
2	2	-0.0907	-1.4161	1.936	-0.064
3	1.936	-0.0019	-1.3571	1.9346	-0.0014
4	1.9346	0	-1.3558	1.9346	0

Table 13: Positive Root of $f(x) = 1 - x + \sin x$

11 $f(x) = -x + \tan x$

11.1 Plots

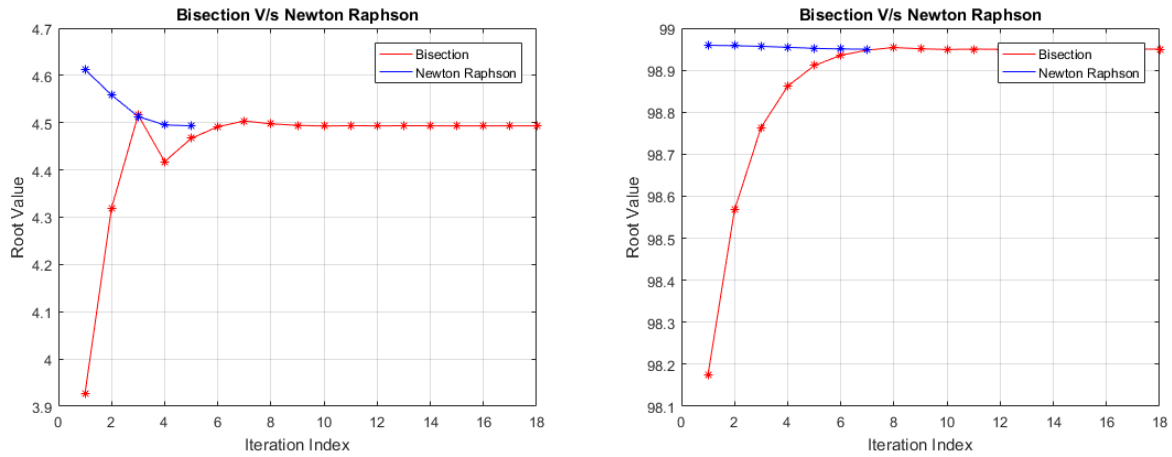


Figure 11: Root of $f(x) = -x + \tan x$

11.2 Tables

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	4.6124	5.3543	99.334	4.5585	-0.0539
2	4.5585	1.8878	41.554	4.5131	-0.0454
3	4.5131	0.4371	24.504	4.4952	-0.0178
4	4.4952	0.0369	20.54	4.4934	-0.0018
5	4.4934	0.0003	20.194	4.4934	0

Table 14: The first Root of $f(x) = -x + \tan x$

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	98.959	901.04	1000000	98.958	-0.0009
2	98.958	427.07	2767005	98.957	-0.0015
3	98.957	191.36	84286	98.954	-0.0023
4	98.954	76.026	30618	98.952	-0.0025
5	98.952	23.028	14879	98.95	-0.0015
6	98.95	3.6571	10528	98.95	-0.0003
7	98.95	0.1259	9816	98.95	0

Table 15: The Root of $f(x) = -x + \tan x$ around 100

12 $f(x) = ax(1-x)$

12.1 $f(x)$ converging towards $x = 0$

12.1.1 Plots

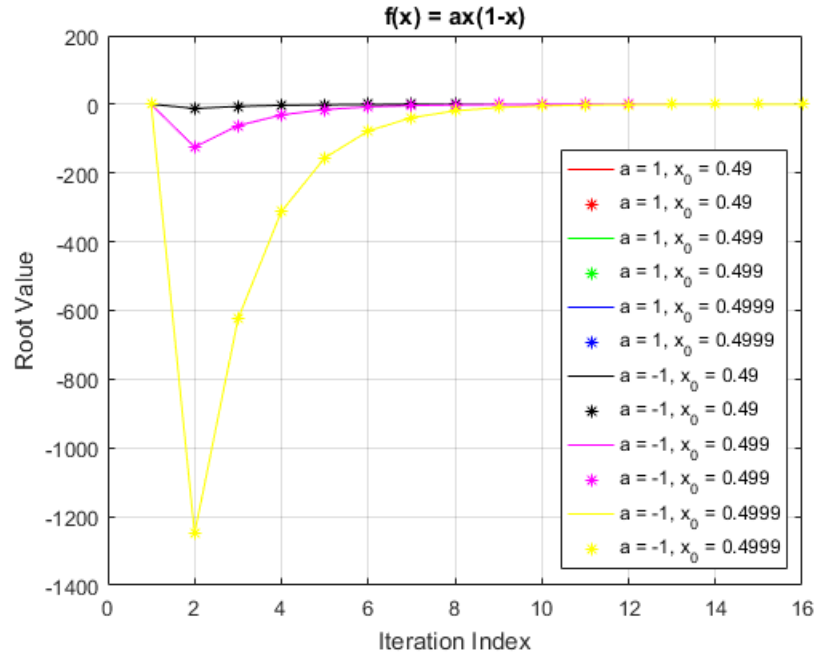


Figure 12: Positive root of $f(x) = ax(1-x)$

12.1.2 Tables

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	0.49	0.2499	0.02	-12.005	-12.495
2	-12.005	-156.13	25.01	-5.7625	6.2425
3	-5.7625	-38.969	12.525	-2.6512	3.1113
4	-2.6512	-9.6801	6.3024	-1.1153	1.5359
5	-1.1153	-2.3591	3.2305	-0.385	0.7302
6	-0.385	-0.5333	1.77	-0.0838	0.3013
7	-0.0838	-0.0908	1.1675	-0.006	0.0777
8	-0.006	-0.006	1.012	0	0.006
9	0	0	1.0001	0	0

Table 16: Root of $f(x) = ax(1-x)$ where $a = 1$ and Initial Point = 0.49

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	0.499	0.25	0.002	-124.5	-125
2	-124.5	-15625	250	-62.001	62.499
3	-62.001	-3906.2	125	-30.753	31.249
4	-30.753	-976.48	62.505	-15.13	15.622
5	-15.13	-244.06	31.261	-7.3232	7.8072
6	-7.3232	-60.952	15.646	-3.4276	3.8956
7	-3.4276	-15.176	7.8551	-1.4956	1.932
8	-1.4956	-3.7324	3.9912	-0.5604	0.9352
9	-0.5604	-0.8745	2.1209	-0.1481	0.4123
10	-0.1481	-0.17	1.2962	-0.0169	0.1312
11	-0.0169	-0.0172	1.0338	-0.0003	0.0166
12	-0.0003	-0.0003	1.0006	0	0.0003
13	0	0	1	0	0

Table 17: Root of $f(x) = ax(1-x)$ where $a = 1$ and Initial Point = 0.499

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	0.4999	0.25	0.0002	-1249.5	-1250
2	-1249.5	-1.5625e+06	2500	-624.5	625
3	-624.5	-3.9062e+05	1250	-312	312.5
4	-312	-97656	625	-155.75	156.25
5	-155.75	-24414	312.5	-77.626	78.124
6	-77.626	-6103.4	156.25	-38.565	39.061
7	-38.565	-1525.8	78.129	-19.035	19.529
8	-19.035	-381.39	39.071	-9.2742	9.7614
9	-9.2742	-95.284	19.548	-4.3999	4.8743
10	-4.3999	-23.759	9.7997	-1.9754	2.4244
11	-1.9754	-5.8778	4.9509	-0.7882	1.1872
12	-0.7882	-1.4095	2.5764	-0.2411	0.5471
13	-0.2411	-0.2993	1.4823	-0.0392	0.2019
14	-0.0392	-0.0408	1.0785	-0.0014	0.0378
15	-0.0014	-0.0014	1.0029	0	0.0014
16	0	0	1	0	0

Table 18: Root of $f(x) = ax(1-x)$ where $a = 1$ and Initial Point = 0.4999

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	0.49	-0.2499	-0.02	-12.005	-12.495
2	-12.005	156.13	-25.01	-5.7625	6.2425
3	-5.7625	38.969	-12.525	-2.6512	3.1113
4	-2.6512	9.6801	-6.3024	-1.1153	1.5359
5	-1.1153	2.3591	-3.2305	-0.385	0.7302
6	-0.385	0.5333	-1.77	-0.0838	0.3013
7	-0.0838	0.0908	-1.1675	-0.006	0.0777
8	-0.006	0.006	-1.012	0	0.006
9	0	0	-1.0001	0	0

Table 19: Root of $f(x) = ax(1-x)$ where $a = -1$ and Initial Point = 0.49

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	0.499	-0.25	-0.002	-124.5	-125
2	-124.5	15625	-250	-62.001	62.499
3	-62.001	3906.2	-125	-30.753	31.249
4	-30.753	976.48	-62.505	-15.13	15.622
5	-15.13	244.06	-31.261	-7.3232	7.8072
6	-7.3232	60.952	-15.646	-3.4276	3.8956
7	-3.4276	15.176	-7.8551	-1.4956	1.932
8	-1.4956	3.7324	-3.9912	-0.5604	0.9352
9	-0.5604	0.8745	-2.1209	-0.1481	0.4123
10	-0.1481	0.17	-1.2962	-0.0169	0.1312
11	-0.0169	0.0172	-1.0338	-0.0003	0.0166
12	-0.0003	0.0003	-1.0006	0	0.0003
13	0	0	-1	0	0

Table 20: Root of $f(x) = ax(1-x)$ where $a = -1$ and Initial Point = 0.499

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	0.4999	-0.25	-0.0002	-1249.5	-1250
2	-1249.5	1.5625e+06	-2500	-624.5	625
3	-624.5	3.9062e+05	-1250	-312	312.5
4	-312	97656	-625	-155.75	156.25
5	-155.75	24414	-312.5	-77.626	78.124
6	-77.626	6103.4	-156.25	-38.565	39.061
7	-38.565	1525.8	-78.129	-19.035	19.529
8	-19.035	381.39	-39.071	-9.2742	9.7614
9	-9.2742	95.284	-19.548	-4.3999	4.8743
10	-4.3999	23.759	-9.7997	-1.9754	2.4244
11	-1.9754	5.8778	-4.9509	-0.7882	1.1872
12	-0.7882	1.4095	-2.5764	-0.2411	0.5471
13	-0.2411	0.2993	-1.4823	-0.0392	0.2019
14	-0.0392	0.0408	-1.0785	-0.0014	0.0378
15	-0.0014	0.0014	-1.0029	0	0.0014
16	0	0	-1	0	0

Table 21: Root of $f(x) = ax(1-x)$ where $a = -1$ and Initial Point = 0.4999

12.2 $f(x)$ converging towards $x = 1$

12.2.1 Plots

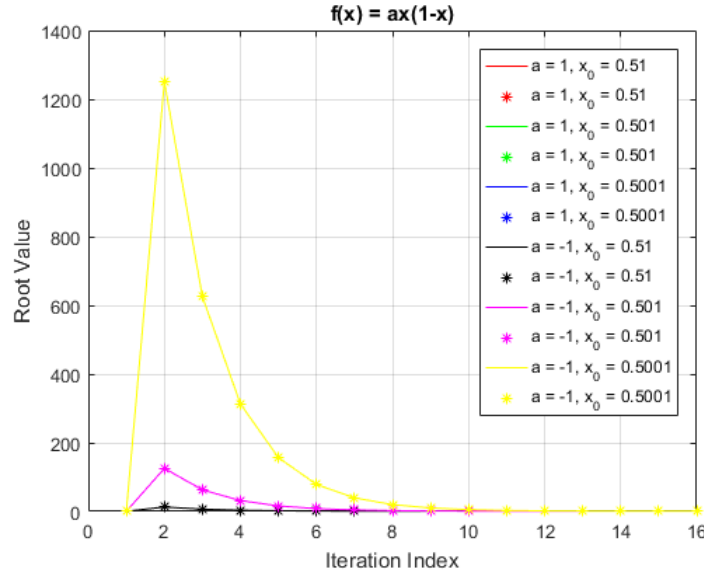


Figure 13: Positive root of $f(x) = ax(1-x)$

12.2.2 Tables

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	0.51	0.2499	-0.02	13.005	12.495
2	13.005	-156.13	-25.01	6.7625	-6.2425
3	6.7625	-38.969	-12.525	3.6512	-3.1113
4	3.6512	-9.6801	-6.3024	2.1153	-1.5359
5	2.1153	-2.3591	-3.2305	1.385	-0.7302
6	1.385	-0.5333	-1.77	1.0838	-0.3013
7	1.0838	-0.0908	-1.1675	1.006	-0.0777
8	1.006	-0.006	-1.012	1	-0.006
9	1	0	-1.0001	1	0

Table 22: Root of $f(x) = ax(1-x)$ where $a = 1$ and Initial Point = 0.51

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	0.501	0.25	-0.002	125.5	125
2	125.5	-15625	-250	63.001	-62.499
3	63.001	-3906.2	-125	31.753	-31.249
4	31.753	-976.48	-62.505	16.13	-15.622
5	16.13	-244.06	-31.261	8.3232	-7.8072
6	8.3232	-60.952	-15.646	4.4276	-3.8956
7	4.4276	-15.176	-7.8551	2.4956	-1.932
8	2.4956	-3.7324	-3.9912	1.5604	-0.9352
9	1.5604	-0.8745	-2.1209	1.1481	-0.4123
10	1.1481	-0.17	-1.2962	1.0169	-0.1312
11	1.0169	-0.0172	-1.0338	1.0003	-0.0166
12	1.0003	-0.0003	-1.0006	1	-0.0003
13	1	0	-1	1	0

Table 23: Root of $f(x) = ax(1-x)$ where $a = 1$ and Initial Point = 0.501

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	0.5001	0.25	-0.0002	1250.5	1250
2	1250.5	-1.5625e+06	-2500	625.5	-625
3	625.5	-3.9062e+05	-1250	313	-312.5
4	313	-97656	-625	156.75	-156.25
5	156.75	-24414	-312.5	78.626	-78.124
6	78.626	-6103.4	-156.25	39.565	-39.061
7	39.565	-1525.8	-78.129	20.035	-19.529
8	20.035	-381.39	-39.071	10.274	-9.7614
9	10.274	-95.284	-19.548	5.3999	-4.8743
10	5.3999	-23.759	-9.7997	2.9754	-2.4244
11	2.9754	-5.8778	-4.9509	1.7882	-1.1872
12	1.7882	-1.4095	-2.5764	1.2411	-0.5471
13	1.2411	-0.2993	-1.4823	1.0392	-0.2019
14	1.0392	-0.0408	-1.0785	1.0014	-0.0378
15	1.0014	-0.0014	-1.0029	1	-0.0014
16	1	0	-1	1	0

Table 24: Root of $f(x) = ax(1-x)$ where $a = 1$ and Initial Point = 0.5001

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	0.51	-0.2499	0.02	13.005	12.495
2	13.005	156.13	25.01	6.7625	-6.2425
3	6.7625	38.969	12.525	3.6512	-3.1113
4	3.6512	9.6801	6.3024	2.1153	-1.5359
5	2.1153	2.3591	3.2305	1.385	-0.7302
6	1.385	0.5333	1.77	1.0838	-0.3013
7	1.0838	0.0908	1.1675	1.006	-0.0777
8	1.006	0.006	1.012	1	-0.006
9	1	0	1.0001	1	0

Table 25: Root of $f(x) = ax(1-x)$ where $a = -1$ and Initial Point = 0.51

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	0.501	-0.25	0.002	125.5	125
2	125.5	15625	250	63.001	-62.499
3	63.001	3906.2	125	31.753	-31.249
4	31.753	976.48	62.505	16.13	-15.622
5	16.13	244.06	31.261	8.3232	-7.8072
6	8.3232	60.952	15.646	4.4276	-3.8956
7	4.4276	15.176	7.8551	2.4956	-1.932
8	2.4956	3.7324	3.9912	1.5604	-0.9352
9	1.5604	0.8745	2.1209	1.1481	-0.4123
10	1.1481	0.17	1.2962	1.0169	-0.1312
11	1.0169	0.0172	1.0338	1.0003	-0.0166
12	1.0003	0.0003	1.0006	1	-0.0003
13	1	0	1	1	0

Table 26: Root of $f(x) = ax(1-x)$ where $a = -1$ and Initial Point = 0.501

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	0.5001	-0.25	0.0002	1250.5	1250
2	1250.5	1.5625e+06	2500	625.5	-625
3	625.5	3.9062e+05	1250	313	-312.5
4	313	97656	625	156.75	-156.25
5	156.75	24414	312.5	78.626	-78.124
6	78.626	6103.4	156.25	39.565	-39.061
7	39.565	1525.8	78.129	20.035	-19.529
8	20.035	381.39	39.071	10.274	-9.7614
9	10.274	95.284	19.548	5.3999	-4.8743
10	5.3999	23.759	9.7997	2.9754	-2.4244
11	2.9754	5.8778	4.9509	1.7882	-1.1872
12	1.7882	1.4095	2.5764	1.2411	-0.5471
13	1.2411	0.2993	1.4823	1.0392	-0.2019
14	1.0392	0.0408	1.0785	1.0014	-0.0378
15	1.0014	0.0014	1.0029	1	-0.0014
16	1	0	1	1	0

Table 27: Root of $f(x) = ax(1-x)$ where $a = -1$ and Initial Point = 0.5001

13 $f(x) = a + x(x - 1)^2$

13.1 Different Initial Points for $a = 0$

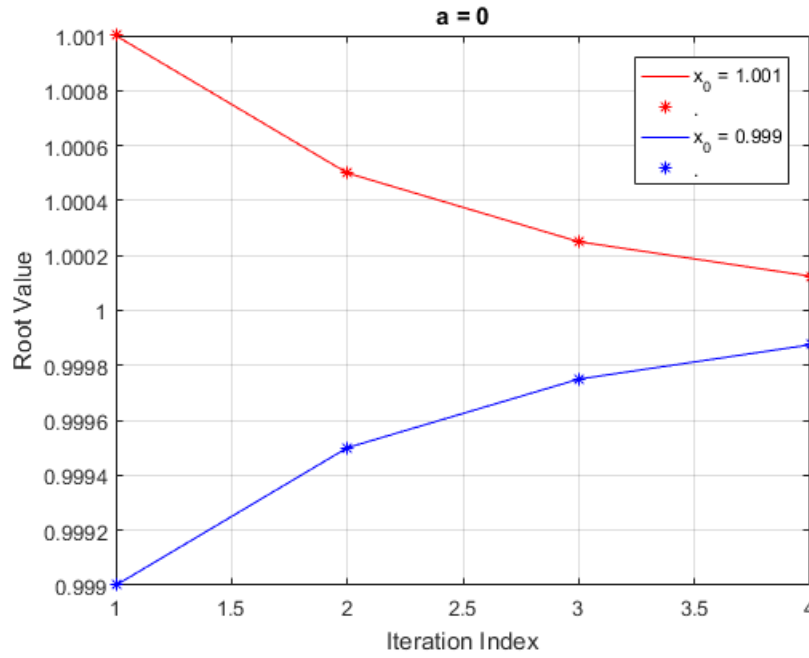


Figure 14: Positive root of $f(x) = ax(1 - x)$

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	0.999	0	-0.002	0.9995	0.0005
2	0.9995	0	-0.001	0.9998	0.0002
3	0.9998	0	-0.0005	0.9999	0.0001
4	0.9999	0	-0.0002	0.9999	0.0001

Table 28: Root of $f(x) = a + x(x - 1)^2$ where $a = 0$ and Initial Point = 0.999

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	1.001	0	0.002	1.0005	-0.0005
2	1.0005	0	0.001	1.0003	-0.0003
3	1.0003	0	0.0005	1.0001	-0.0001
4	1.0001	0	0.0003	1.0001	-0.0001

Table 29: Root of $f(x) = a + x(x - 1)^2$ where $a = 0$ and Initial Point = 1.001

13.2 Different Initial Points for $a = 0.03$

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	0.999	0.03	-0.002	16.022	15.023
2	16.022	3615.6	707.03	10.908	-5.1138
3	10.908	1070.9	314.34	7.5013	-3.407
4	7.5013	317.09	139.8	5.2332	-2.2681
5	5.2332	93.81	62.227	3.7257	-1.5075
6	3.7257	27.709	27.739	2.7268	-0.9989
7	2.7268	8.1603	12.399	2.0686	-0.6582
8	2.0686	2.3921	5.5628	1.6386	-0.43
9	1.6386	0.6982	2.5005	1.3594	-0.2792
10	1.3594	0.2055	1.1061	1.1735	-0.1858
11	1.1735	0.0653	0.4374	1.0242	-0.1494
12	1.0242	0.0306	0.0501	0.413	-0.6112
13	0.413	0.1723	-0.1403	1.6415	1.2285
14	1.6415	0.7055	2.5175	1.3613	-0.2802
15	1.3613	0.2076	1.114	1.1749	-0.1864
16	1.1749	0.0659	0.4414	1.0255	-0.1493
17	1.0255	0.0307	0.053	0.4469	-0.5786
18	0.4469	0.1667	-0.1884	1.3318	0.8849
19	1.3318	0.1766	0.9937	1.1541	-0.1777
20	1.1541	0.0574	0.3793	1.0028	-0.1513
21	1.0028	0.03	0.0055	-4.416	-5.4187
22	-4.416	-129.5	77.167	-2.7378	1.6782
23	-2.7378	-38.219	34.437	-1.6279	1.1098
24	-1.6279	-11.213	15.462	-0.9028	0.7252
25	-0.9028	-3.2386	7.0562	-0.4438	0.459
26	-0.4438	-0.8952	3.3661	-0.1779	0.2659
27	-0.1779	-0.2168	1.8064	-0.0579	0.12
28	-0.0579	-0.0348	1.2415	-0.0299	0.028
29	-0.0299	-0.0017	1.1222	-0.0284	0.0015
30	-0.0284	0	1.1159	-0.0284	0

Table 30: Root of $f(x) = a + x(x-1)^2$ where $a = 0.03$ and Initial Point = 0.999

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	1.001	0.03	0.002	-13.977	-14.978
2	-13.977	-3135.2	642.98	-9.101	4.876
3	-9.101	-928.55	285.89	-5.8531	3.2479
4	-5.8531	-274.86	127.19	-3.692	2.161
5	-3.692	-81.251	56.662	-2.2581	1.434
6	-2.2581	-23.939	25.329	-1.3129	0.9451
7	-1.3129	-6.9937	11.423	-0.7007	0.6122
8	-0.7007	-1.9966	5.2756	-0.3222	0.3785
9	-0.3222	-0.5333	2.6004	-0.1171	0.2051
10	-0.1171	-0.1162	1.5097	-0.0402	0.077
11	-0.0402	-0.0135	1.1655	-0.0286	0.0116
12	-0.0286	-0.0003	1.1169	-0.0284	0.0003
13	-0.0284	0	1.1159	-0.0284	0

Table 31: Root of $f(x) = a + x(x-1)^2$ where $a = 0.03$ and Initial Point = 1.001

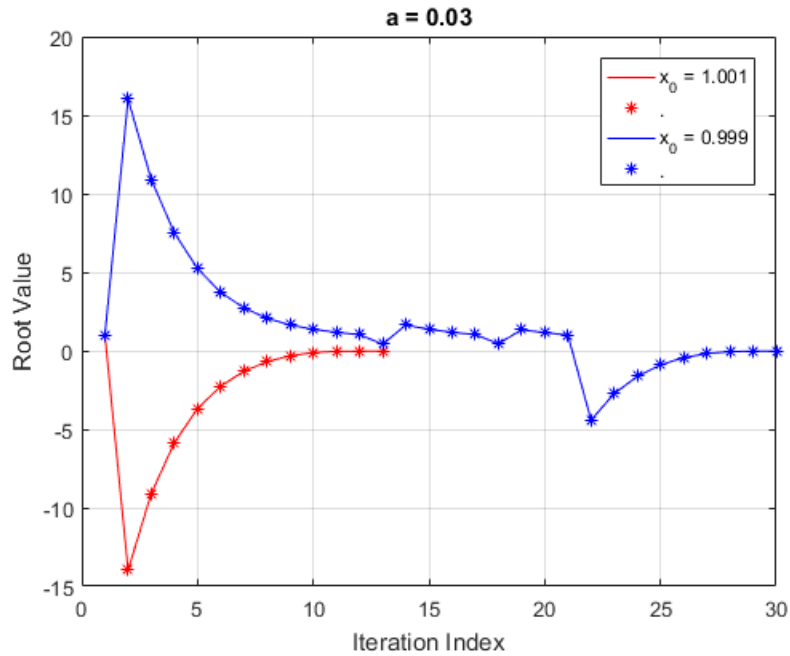


Figure 15: Positive root of $f(x) = ax(1-x)$

13.3 Different Initial Points for $a = 0.07$

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	0.999	0.07	-0.002	36.052	35.053
2	36.052	44295	3756	24.259	-11.793
3	24.259	13124	1669.5	16.398	-7.8611
4	16.398	3888	742.09	11.159	-5.2392
5	11.159	1151.6	329.91	7.668	-3.4907
6	7.668	341	146.72	5.3438	-2.3242
7	5.3438	100.9	65.294	3.7985	-1.5453
8	3.7985	29.818	29.092	2.7735	-1.025
9	2.7735	8.7938	12.983	2.0962	-0.6773
10	2.0962	2.5889	5.7974	1.6496	-0.4466
11	1.6496	0.7662	2.5653	1.351	-0.2987
12	1.351	0.2364	1.0715	1.1303	-0.2206
13	1.1303	0.0892	0.3116	0.8441	-0.2863
14	0.8441	0.0905	-0.2389	1.223	0.3789
15	1.223	0.1308	0.595	1.0032	-0.2198
16	1.0032	0.07	0.0063	-10.043	-11.046
17	-10.043	-1224.5	343.73	-6.4802	3.5624
18	-6.4802	-362.51	152.9	-4.1092	2.3709
19	-4.1092	-107.2	68.094	-2.535	1.5743
20	-2.535	-31.607	30.418	-1.4959	1.0391
21	-1.4959	-9.2484	13.696	-0.8206	0.6752
22	-0.8206	-2.6502	6.3028	-0.4002	0.4205
23	-0.4002	-0.7145	3.081	-0.1683	0.2319
24	-0.1683	-0.1596	1.758	-0.0774	0.0908
25	-0.0774	-0.0199	1.3278	-0.0625	0.015
26	-0.0625	-0.0005	1.2615	-0.0621	0.0004
27	-0.0621	0	1.2598	-0.0621	0

Table 32: Root of $f(x) = a + x(x - 1)^2$ where $a = 0.07$ and Initial Point = 0.999

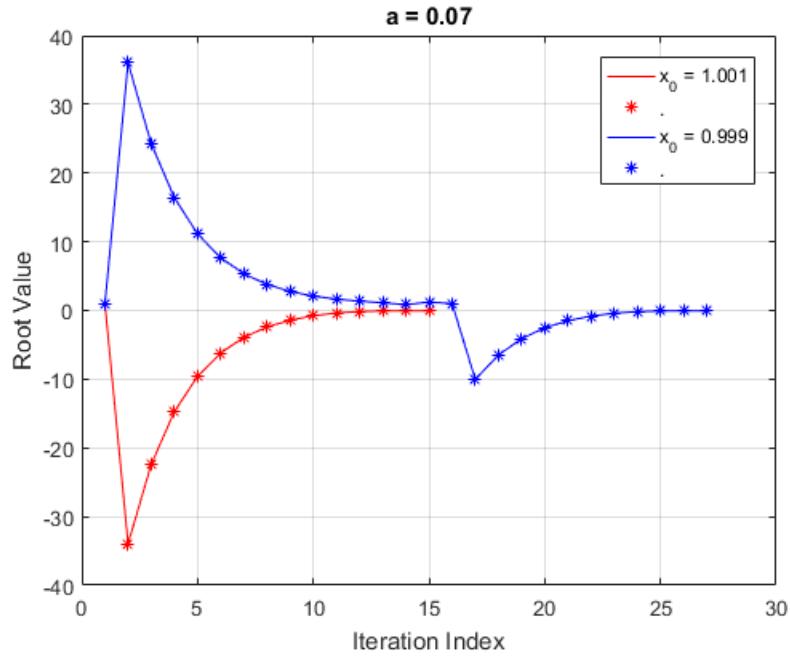


Figure 16: Positive root of $f(x) = ax(1-x)$

ItrNo	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}	$x_{n+1} - x_n$
1	1.001	0.07	0.002	-33.947	-34.948
2	-33.947	-41459	3594	-22.411	11.536
3	-22.411	-12283	1597.5	-14.722	7.6894
4	-14.722	-3638.9	710.1	-9.5974	5.1245
5	-9.5974	-1077.8	315.72	-6.1838	3.4137
6	-6.1838	-319.05	140.45	-3.9121	2.2716
7	-3.9121	-94.327	62.563	-2.4044	1.5077
8	-2.4044	-27.798	27.962	-1.4103	0.9941
9	-1.4103	-8.1232	12.608	-0.766	0.6443
10	-0.766	-2.319	5.8244	-0.3679	0.3982
11	-0.3679	-0.6183	2.8773	-0.153	0.2149
12	-0.153	-0.1334	1.6821	-0.0737	0.0793
13	-0.0737	-0.015	1.3111	-0.0623	0.0114
14	-0.0623	-0.0003	1.2608	-0.0621	0.0002
15	-0.0621	0	1.2598	-0.0621	0

Table 33: Root of $f(x) = a + x(x-1)^2$ where $a = 0.07$ and Initial Point = 1.001