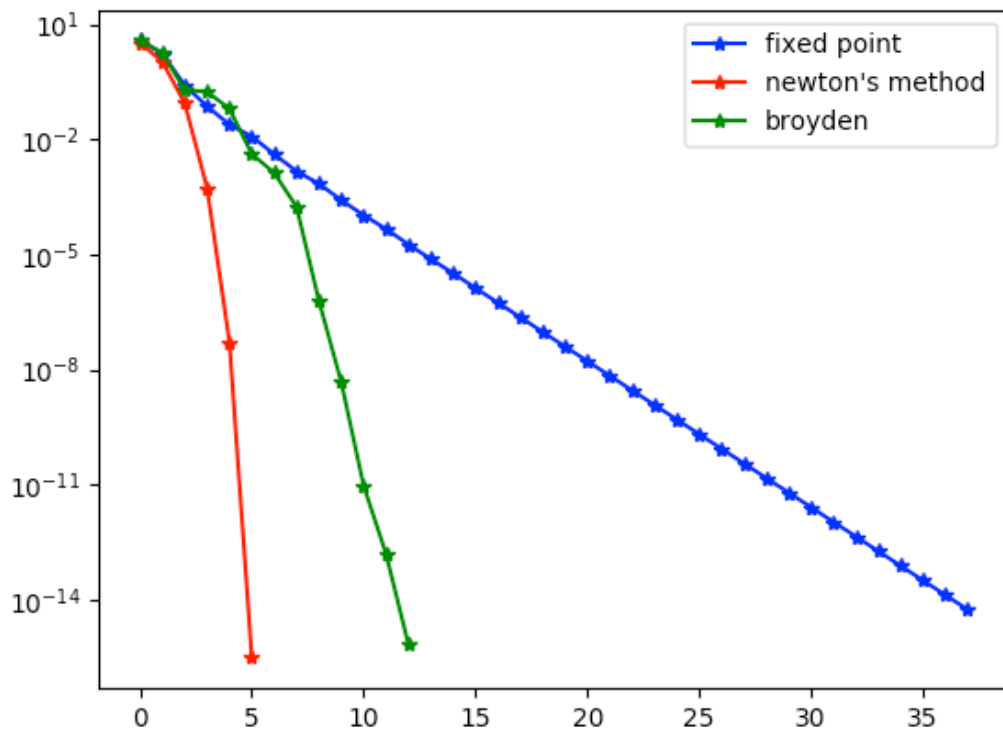


2.



b) the value of the constant C is 0.3978466 ,
the r is $0.9985682598 \approx 1$. If $r=1$
and $0 < C < 1 \Rightarrow$ linear convergence, which matches
the shape on the graph.

c) the value of r is 2.04728583. From the graph, we can observe that the Newton's method converges much faster than fixed point method. The error looks like decreases quadratically for Newton's method. However, the Newton's method does not guaranteed to converge. I tried the initial value $= [12, 12, 12]$ Newton's method can not converge with this initial value.

d) The value of r for broyden's method is 1.32847765, which is not very close to its theoretically value. The possible reason is that the function provided only check last few x values. Overall, the Broyden's method

converges faster than fixed point method but slower than newton's method. Thus it is also superlinear convergence.

3. d)

method

sample size mean

sample size std

56.74

53.54

naïve method

19.13

10.97

deflation method

40.35

34.06

modified deflation

time mean

time std

method

0.0212

0.0200

naïve method

0.0198

0.0169

deflation method

0.0508

0.0498

modified deflation

The result of naive search and modified deflation can be very different depending on the initial value of X , which means they are lot easier to get to the similar root than the deflated method.

Overall, the deflation method takes least samples to get 4 roots, and the modified ranked the second and naive search ranked the last.

However, in terms of time consumption, the naive method has a very good performance, which is very close to the deflated method. The modified deflation method has the worst performance, which requires more than double amount of time than other two methods.

