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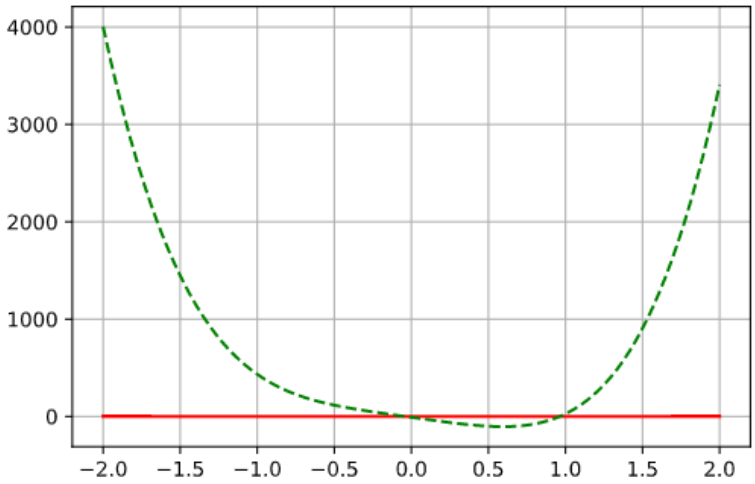
Q2 Answer:

a) Function Plot:

From graph it can be seen that root lies close to (0,0)



b) For a0 = -0.5 and b0 = 0.5

i) False Position Method:

Output:

Final Root Found Iteration- 20, x0 = -0.040659 x1 = -0.040659 x2 = -0.040659 and f(x2) = 0.000000
Required Root is: -0.040659

Table:

Iteration	x0	x1	x2	f(x2)
1	-0.5	0.5	0.03521939953810624	-16.771183408860622
2	-0.5	0.03521939953810624	-0.032451320289285546	-1.819140487420463
3	-0.5	-0.032451320289285546	-0.03967799044957828	-0.21754935825343757
4	-0.5	-0.03967799044957828	-0.04054060186022612	-0.026313185642621306
5	-0.5	-0.04054060186022612	-0.04064491336547312	-0.0031869883575676994
6	-0.5	-0.04064491336547312	-0.04065754697108209	-0.0003860638106054637
7	-0.5	-0.04065754697108209	-0.04065907736941614	-4.6767739380726425e-05
8	-0.5	-0.04065907736941614	-0.04065926276167405	-5.665453935321807e-06
9	-0.5	-0.04065926276167405	-0.04065928522013067	-6.863145003421778e-07
10	-0.5	-0.04065928522013067	-0.04065928794075367	-8.314031418876766e-08
11	-0.5	-0.04065928794075367	-0.04065928827033635	-1.0071639522379883e-08
12	-0.5	-0.04065928827033635	-0.04065928831025568	-1.220081813357865e-09
13	-0.5	-0.04065928831025568	-0.04065928831509204	-1.4780177082229784e-10
14	-0.5	-0.04065928831509204	-0.04065928831567810	-1.7903900584315124e-11
15	-0.5	-0.04065928831567810	-0.04065928831574907	-2.168931700907706e-12
16	-0.5	-0.04065928831574907	-0.04065928831575767	-2.646771690706373e-13
17	-0.5	-0.04065928831575767	-0.04065928831575872	-3.019806626980426e-14
18	-0.5	-0.04065928831575872	-0.04065928831575884	-5.329070518200751e-15
19	-0.5	-0.04065928831575884	-0.04065928831575865	1.7763568394002505e-15
20	-0.040659288315758865	-0.04065928831575884	-0.04065928831575886	0.0

ii) Secant Method:

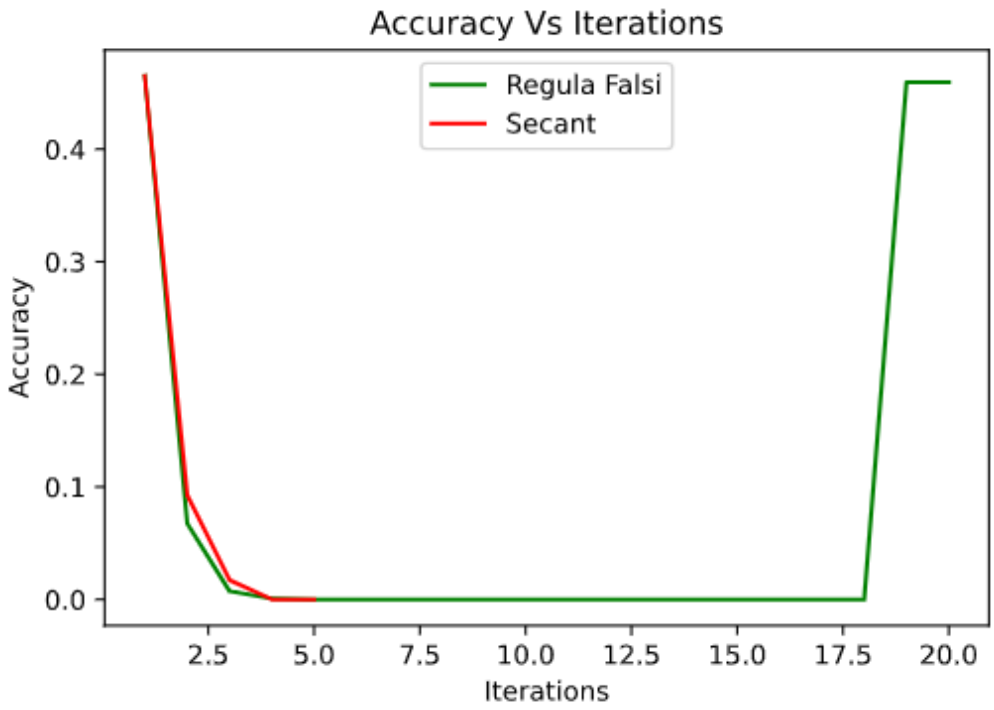
Output:

Final Root Found Iteration- 5, a = -0.040606 b =-0.040659 c = -0.040659 f(x2) = 0.000000
Required root is: -0.040659249655343

Table:

Iteration	x0	x1	x2	f(x2)
1	-0.5	0.5	0.03521939953810621	-16.771183408860615
2	0.5	0.03521939953810621	-0.05773904901091853	3.789425453554811
3	0.03521939953810621	-0.05773904901091853	-0.04060633113219046	-0.011740816998120351
4	-0.05773904901091853	-0.04060633113219046	-0.04065924965534291	-8.571185672323622e-06
5	-0.04060633113219046	-0.04065924965534291	-0.04065928831584276	1.8602008822199423e-11

c) Combined Plot between Regula Falsi and Secant Method:



Here it can be seen that for given function with initial gausses (a0,b0) = (-0.5,0.5), Secant method converges much faster than Regula Falsi method, because order of convergence for secant method is 1.681 and for Regula Falsi method, it's only 1.

d) Let us consider a non-bracketing interval (a0,b0) = (-1.5,-0.5)

Output:

Final Root Found Iteration- 6, a = -0.040692 b =-0.040659 c = -0.040659 f(x2) = 0.000000
Required root is: -0.040659298013109

Table:

Iteration	x0	x1	x2	f(x2)
1	-1.5	-0.5	-0.4129086809470124	89.2057455761888
2	-0.5	-0.4129086809470124	-0.12159772317239098	18.02409184884958
3	-0.4129086809470124	-0.12159772317239098	-0.04783411717893431	1.5911668779578445
4	-0.12159772317239098	-0.04783411717893431	-0.040691736448575995	0.007193904528374873
5	-0.04783411717893431	-0.040691736448575995	-0.04065929801310935	2.1499456153151186e-06
6	-0.040691736448575995	-0.04065929801310935	-0.04065928831577175	2.858158154595003e-12

Graph: