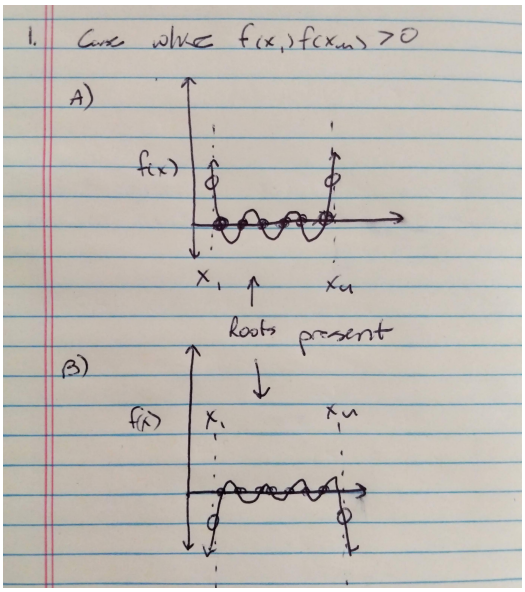
Andrew Sivaprakasam | Warm-Up 2 Write-up
GitHub Repo: `https://github.com/sivaprakasaman/Numerical_Methods_BME/`

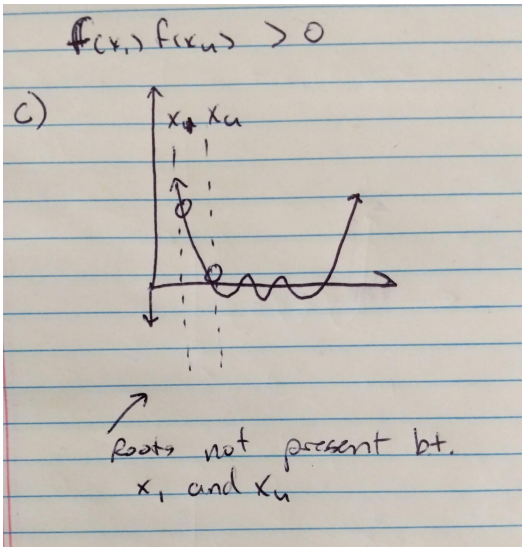
1 Solving a Nonlinear Single Equation

1.2 Bisection Method Thought Exercise | Task List 1-A

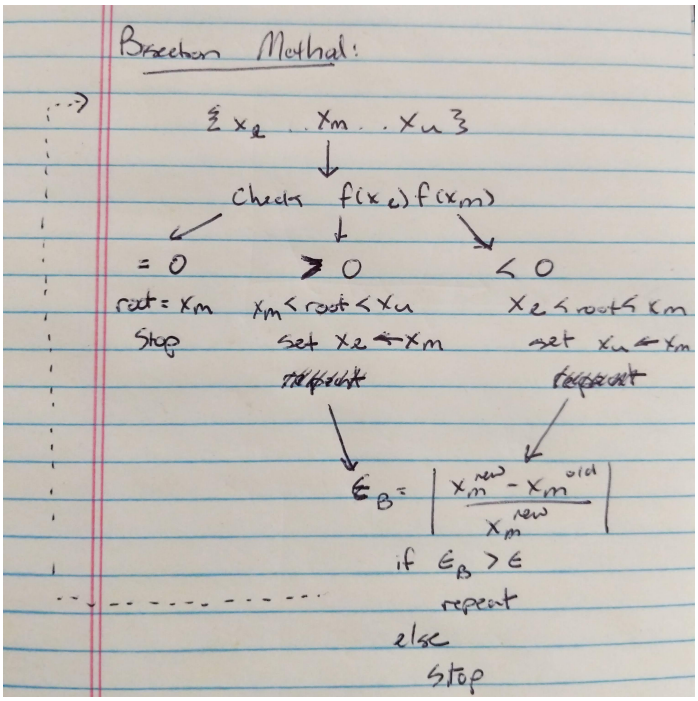
1. A, B, and C demonstrate cases where there may or may not be a root between $f(x_1)$ and $f(x_m)$ when their product is greater than zero. ****Note:** when I drew these, I accidentally put x_u instead of x_m

2. A and B also demonstrate that there may be multiple roots between x_1 and x_u when their product is greater than zero.



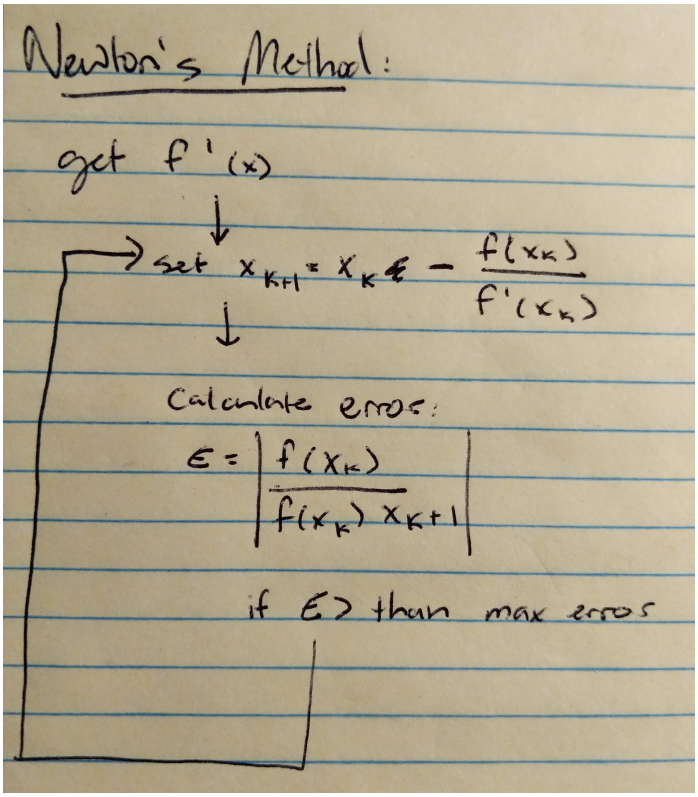


3. Bisection Method Flowchart:



1.3 Newton's Method | Task List 1-B

1. Below is a flowchart demonstrating Newton's Method:



2. Here is a table showing iteration, x_k, and ϵ for the first root-finding problem.

Iteration:	x_k	ϵ
0	0.0001	Inf
1	12.1110599939339	0.999991743084416
2	8.09254045425263	0.496570831174469
3	5.41361087712689	0.494850782209803
4	3.62778285976004	0.492264307540438
5	2.43741808799465	0.488371189837504
6	1.64412174520381	0.482504622972731
7	1.11567626862556	0.473654850819105
8	0.764004170068376	0.460301281504405
9	0.530486635106756	0.4401949446184
10	0.376190426783818	0.410154531687765
11	0.275373819319325	0.366108178742967
12	0.211187744354396	0.303928976376667
13	0.172826641969727	0.221962898471344
14	0.153391893645413	0.126699970007799
15	0.147073149341482	0.042963275976772
16	0.146368082588206	0.004817079931691
17	0.146359505957651	5.86E-05

3. Here is a table for the minimization problem, also showing iteration, x_k, and ϵ.

Iteration:	x_k	ϵ
0	0.0001	Inf
1	0.000149999999833	0.333333332592593
2	0.000224999999188	0.333333331666667
3	0.000337499996883	0.333333329583333
4	0.000506249988917	0.333333324895831
5	0.000759374961751	0.333333314348947
6	0.001139062369644	0.333333290618432
7	0.00170859330815	0.333333237224644
8	0.002562889130906	0.333333117087963
9	0.003844330890635	0.333332846777108
10	0.005766486866465	0.333332238560854
11	0.008649698338921	0.333330869989077
12	0.012974439631194	0.333327790271208
13	0.019461295288647	0.333320858721965
14	0.029190713347596	0.333305251676902
15	0.04378191598064	0.333270079808662
16	0.065658822246247	0.333190659186057
17	0.098440566721274	0.333010521646483
18	0.147498131597946	0.332597873242183
19	0.220683936420136	0.33163177170657
20	0.329016592031842	0.329261983241325
21	0.485904191232183	0.322877641377197
22	0.696765770952346	0.302629073514841
23	0.901552858583132	0.227149285459121
24	0.948720416981045	0.049717026801222
25	0.947747874126513	0.001026162000551
26	0.947747133517416	7.81E-07

1.4 Comparison of Algorithms | Task List 1-C

DO THIS!!!!

2 Runge-Kutta Methods