**HW 3 CS384**

6a.

K = 1

step: 0 value: 3.5

step: 1 value: 2.7

step: 2 value: 2.2

step: 3 value: 1.9

step: 4 value: 1.8

------------------------------

Total Number of Steps: 4

The root of the function is: 1.8

K=3

step: 0 value: 3.47

step: 1 value: 2.726

step: 2 value: 2.197

step: 3 value: 1.914

step: 4 value: 1.835

step: 5 value: 1.829

step: 6 value: 1.829

------------------------------

Total Number of Steps: 6

The root of the function is: 1.829

K=5

step: 0 value: 3.4698

step: 1 value: 2.72613

step: 2 value: 2.19729

step: 3 value: 1.91427

step: 4 value: 1.835

step: 5 value: 1.82941

step: 6 value: 1.82938

step: 7 value: 1.82938

------------------------------

Total Number of Steps: 7

The root of the function is: 1.82938

K=7

step: 0 value: 3.469798

step: 1 value: 2.7261265

step: 2 value: 2.1972945

step: 3 value: 1.9142731

step: 4 value: 1.8349958

step: 5 value: 1.8294099

step: 6 value: 1.8293836

step: 7 value: 1.8293836

------------------------------

Total Number of Steps: 7

The root of the function is: 1.8293836

K=11

step: 0 value: 3.46979801051

step: 1 value: 2.72612646918

step: 2 value: 2.19729448423

step: 3 value: 1.91427308421

step: 4 value: 1.83499579665

step: 5 value: 1.82940987408

step: 6 value: 1.82938360251

step: 7 value: 1.82938360193

step: 8 value: 1.82938360193

------------------------------

Total Number of Steps: 8

The root of the function is: 1.82938360193

The number of steps didn’t change that much overall based on the different tolerances. It basically doubled from having the tolerance at k=1 where it took 4 steps and then k=11 where it took 8 steps. So the tolerances didn’t seem to have too much of an affect on the number of steps.

Based on the results of all the given tolerances you can tell that the Step counting shows Quadratic Convergences. If you were to take each point and graph you would easily see that all the steps and points make a quadratic graph making it quadratic convergences.

8. These are all to the tolerance of 10^-7

1. Interval [1,2]

step: 0 value: 1.6783085

step: 1 value: 1.8081029

step: 2 value: 1.8322985

step: 3 value: 1.8293312

step: 4 value: 1.8293835

step: 5 value: 1.8293836

step: 6 value: 1.8293836

step: 7 value: 1.8293836

------------------------------

Total Number of Steps: 7

The root of the function is: 1.8293836

1. Interval [1.3,2]

step: 0 value: 1.520607

step: 1 value: 1.2043577

step: 2 value: 1.4381285

step: 3 value: 1.4108819

step: 4 value: 1.3968333

step: 5 value: 1.397769

step: 6 value: 1.3977485

step: 7 value: 1.3977485

step: 8 value: 1.3977485

------------------------------

Total Number of Steps: 8

The root of the function is: 1.3977485

1. Interval [2,3]

step: 0 value: 2.3544899

step: 1 value: 2.3731488

step: 2 value: 2.3706741

step: 3 value: 2.3706869

step: 4 value: 2.3706869

step: 5 value: 2.3706869

------------------------------

Total Number of Steps: 5

The root of the function is: 2.3706869

[3,4]

step: 0 value: 3.4796989

step: 1 value: 3.6802325

step: 2 value: 3.7319205

step: 3 value: 3.7218338

step: 4 value: 3.722111

step: 5 value: 3.7221128

step: 6 value: 3.7221128

step: 7 value: 3.7221128

------------------------------

Total Number of Steps: 7

The root of the function is: 3.7221128

1. Interval [1,2]

step: 0 value: 1.5906161

step: 1 value: 1.2845478

step: 2 value: 1.4279661

step: 3 value: 1.4136346

step: 4 value: 1.4123782

step: 5 value: 1.4123912

step: 6 value: 1.4123912

step: 7 value: 1.4123912

------------------------------

Total Number of Steps: 7

The root of the function is: 1.4123912

[e,4]  
step: 0 value: 2.9185683

step: 1 value: 3.0050992

step: 2 value: 3.0618995

step: 3 value: 3.0569522

step: 4 value: 3.0571031

step: 5 value: 3.0571036

step: 6 value: 3.0571035

step: 7 value: 3.0571035

------------------------------

Total Number of Steps: 7

The root of the function is: 3.0571035

1. [0,1]

step: 0 value: 0.7802027

step: 1 value: 0.9028667

step: 2 value: 0.9106235

step: 3 value: 0.910005

step: 4 value: 0.9100076

step: 5 value: 0.9100076

step: 6 value: 0.9100076

------------------------------

Total Number of Steps: 6

The root of the function is: 0.9100076

[3,5]

step: 0 value: 3.1721565

step: 1 value: 3.3172262

step: 2 value: 4.1915996

step: 3 value: 3.5690437

step: 4 value: 3.6743313

step: 5 value: 3.7431648

step: 6 value: 3.7325181

step: 7 value: 3.7330738

step: 8 value: 3.733079

step: 9 value: 3.733079

step: 10 value: 3.733079

------------------------------

Total Number of Steps: 10

The root of the function is: 3.733079

F.[0,1]

step: 0 value: 0.6786141

step: 1 value: 0.5690623

step: 2 value: 0.5892596

step: 3 value: 0.5885384

step: 4 value: 0.5885327

step: 5 value: 0.5885327

step: 6 value: 0.5885327

------------------------------

Total Number of Steps: 6

The root of the function is: 0.5885327

[3,4]

step: 0 value: 3.1054104

step: 1 value: 3.095336

step: 2 value: 3.0963635

step: 3 value: 3.0963639

step: 4 value: 3.0963639

step: 5 value: 3.0963639

------------------------------

Total Number of Steps: 5

The root of the function is: 3.0963639

[6,7]

step: 0 value: 6.3005369

step: 1 value: 6.2835948

step: 2 value: 6.2850494

step: 3 value: 6.2850493

step: 4 value: 6.2850493

------------------------------

Total Number of Steps: 4

The root of the function is: 6.2850493

The two algorithms end up giving you the same answer like they should. I found out that the secant method seems to get closer to the answer faster. If you compare each step with the secant algorithm compared to the ones with the newton algorithm the secant steps are closer to the answer faster than the newton one. That is what I feel the main difference between them are.