

Introduction to Week Two

Root-Finding Methods

Order of Convergence

Root Finding in MATLAB

Quiz

Programming Assignment:
Computation of the Feigenbaum Delta

✔ **Video:** Feigenbaum Delta (Part A) | Lecture 21
16 min

✔ **Reading:** Compute the Value of m in the Period-Two Cycle
1 min

✔ **Video:** Feigenbaum Delta (Part B) | Lecture 22
17 min

✔ **Video:** Feigenbaum Delta (Part C) | Lecture 23
8 min

✔ **Ungraded External Tool:** Computation of the Feigenbaum Delta (audit)

✔ **Reading:** Reference Solution to "Computation of the Feigenbaum Delta (audit)"
1 min

🔒 **Graded External Tool:** Computation of the Feigenbaum Delta
1h

🔒 **Reading:** Reference Solution to "Computation of the Feigenbaum Delta"
1 min

Reference Solution to "Computation of the Feigenbaum Delta (audit)"

num_doublings=11; num_newton=10;

n=0; m(1+n)=2; %analytic
n=1; m(1+n)=1+sqrt(5); %analytic
delta=zeros(1,11); delta(1)=5;

```
for n=2:num_doublings
    N=2^n;
    mu=m(n)+(m(n)-m(n-1))/delta(n-1); %initial guess for m(1+n)
    for i=1:num_newton %Newton's iteration
        x=1/2; y=0;
        for j=1:N
            y=x*(1-x) + mu*y*(1-2*x);
            x=mu*x*(1-x);
        end
        Delta = (x-1/2)/y; %Newton's method
        mu = mu - Delta;
    end
    m(1+n)=mu;
    delta(n)=(m(n)-m(n-1))/(m(n+1)-m(n));
end
% Output your results
fprintf('n    delta(n)\n');
for n=1:num_doublings
    fprintf('%2g %18.15f\n',n,delta(n));
end
```

✔ **Completed** **Go to next item**

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