Numerical Analysis

Math 370 Fall 1998 MWF 11:30am - 12:25pm

 Fowler 127

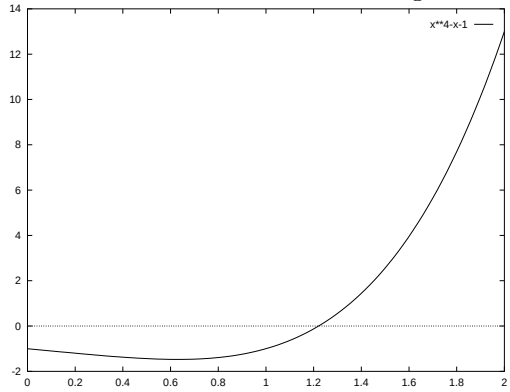
Class 13: **Friday October 02**

SUMMARY Analyzing Root Finding Algorithms Continued: False Position and Newton-Raphson

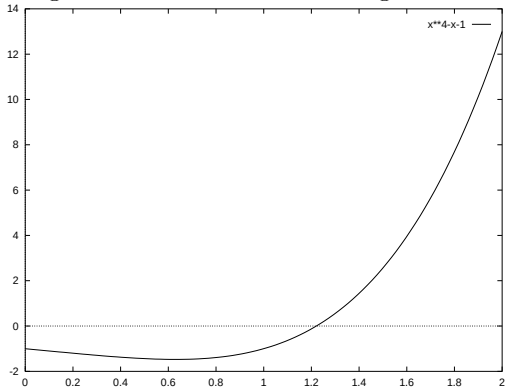
READING Burden & Faires, 65–75

Bands Of Convergence

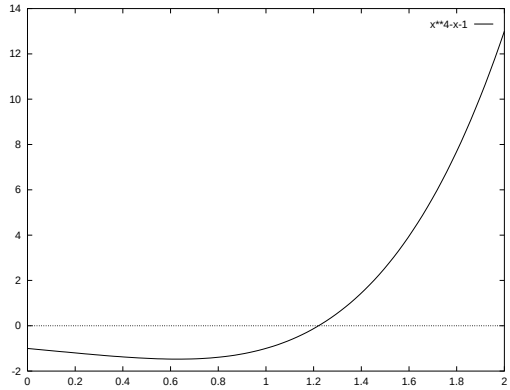
On the axes below, shade in the regions corresponding to the different convergence criteria.



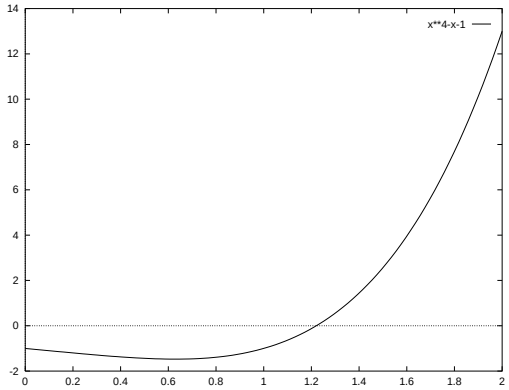
$|p_{n-1} - p_n| <$ XTOL



$f(p_n) <$ FTOL



$|p_{n-1} - p_n| <$ XTOL **AND** $f(p_n) <$ FTOL



$|p_{n-1} - p_n| <$ XTOL **OR** $f(p_n) <$ FTOL

Assessing Bisection

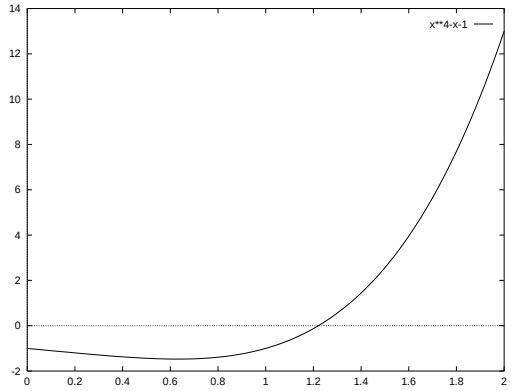
What are some good features of the bisection algorithm?

What are some drawbacks to the bisection algorithm?

False Position Method (Regula Falsi)

The method of False Position is another ancient method of computing the solution of equations of one variable. It is very similar to the bisection method in that it too is a bracketing method, except that False Position uses the **value** of the function at the end points to help determine where the next bracket occurs. Sketch a picture of this process, below:

False Position visually



Exercise

Let's try and derive the iterative step used in the False Position algorithm.

Example

Use False Position to solve the same equation $f(d) = 2552 - 30d^2 + d^3 = 0$ you previously solved using Bisection and see if there is a difference in the number of steps False Position takes to converge versus Bisection. (In `q:\calculus\370` there are a number of TruBasic implementation of algorithms mentioned in Burden & Faires.)

How did you pick your two initial guesses?