Individual Research - Rate of convergence to a square root

Lynn Robert Carter, PhD

2018-02-25

Activity Kind

Individual Research

Purpose

The purpose of this activity is to learn more about Newton's Method for computing square root (also known as the Newton-Raphson Method).

Pre-requisite

Students are expected to have participated in the

- Group Discussion - Discuss how Newton's Method for finding square root works
- Small Group Exercise - Doing UNumber arithmetic with different sized operands

Tasking

Continue working with the UNumber library and the small program you used to compute square root using the UNumber library. (Do **not** integrate this into your calculator!) As you do the following, take notes in your ENB about what you did and any surprising results.

Set the program to work with values of 50 significant digits and compute the square root of the value 2E6 (2,000,000).

Using the console display results, produce and Excel worksheet with column A containing the iteration number, column B containing the oldGuess value, columns C containing the newGuess value, and column D containing the results of the howManyDigitsMatch (oldGuess, NewGuess) value.

Extend the columns as if the loop continued while maintaining the limit of 50 significant digits for the values for three more iterations.

Using the charting facility of Excel to produce of chart of column A as the x-axis and column D as the y-axis.

Save a copy of the console output, the Excel spreadsheet, and the chart to your ENB as evidence of the work you have done.

Deliverable

Each individual is expected to provide evidence of these experiments in their ENB. If we do not see notes that make it clear that you did the work, we can only assume that you just copied the results from someone else.

Submission

Students are expected to **complete** this part of their ENB prior to midnight.