The race to the Golden Ratio

# Abstract

Previously, I evaluated how to obtain the Golden Ratio for recurrent sequences other than the famous Fibonacci sequence.

# Mathematical review

Previously, I had obtained the following equation detailing how to generate a recurrent sequence that converges at the Golden Ratio:

When I wrote an example to prove this using a Bolt sequence, I found that it converged much quicker than Fibonacci:

# Thesis

This begs the question: what parameters are needed to generate the Golden Ratio with the smallest n? And does this change with respect to n?

This is essential to ask as, if the mathematics proves n, the optimum solution can yield to the discovery of greater digits. The reason is that the computing power and time would remain constant, whilst the algorithm increases in speed. Currently, the record stands at 2 trillion digits [[1]](http://www.numberworld.org/digits/GoldenRatio/)

# Methodology

The equation will be expressed in software, and Fn/Fn-1 will be calculated from this. In each iteration, as n grows, the value will be checked against the current value of the Golden Ratio.

The objective is that, for a given x, the function should be accurate to a constant large number of decimal places

Different values for x will be tested against. This is the only independent variable, as the initial terms and the Golden Ratio checks will remain constant.

The processing time will be measured for each value of x, as will the final value of n.

To be continued...