AMath Tea Time — Puzzle #12

1 December 2015

Problem

A "number bracelet" is a sequence of numbers (or a fashionable mathematical accessory) constructed in the following way: first, choose two integers between zero and nine. The next number of the sequence is the **ones digit** of the sum of the previous two elements of the sequence. Continue to write out this sequence until you arrive at the same pair of numbers as the **initial pair**.

For example, if the first two elements of the number bracelet are 2 and 6 the resulting bracelet is,

$$2, 6, 8, 4, 2, 6.$$

If, instead, the bracelet begins with 1 and 3 the result is,

$$1, 3, 4, 7, 1, 8, 9, 7, 6, 3, 9, 2, 1, 3.$$

(a) Does every number bracelet terminate?

(b) Your wise-ass friend instead begins their number bracelet with two **rational** numbers between 0 and 10. Will their bracelet terminate?

(c) What if they choose any two **real** numbers between 0 and 10?

Hints

If you have any puzzles to share then send them my way at `cswiercz@uw.edu`*!*