Finance 6320: Computational Finance

January 17, 2017

Today's Agenda:

1. Review of installations, setup, etc. Also questions?
2. Computer Representation of Numbers
3. Algorithms

Installation, Setup, Etc

Questions?

Computer Representation of Numbers

It is crucial to understand that computers **DO NOT** represent numbers the same way that we do as humans.

The Word *digital* in digital computer means that computers use binary digits, that is 0's and 1's to represent numbers. This is also known as base 2 representation.

Two Guiding Principles

Throughout the course we will repeat two guiding principles:

1. *Computer numbers are not the same as real numbers, and the arithmetic operations on computer numbers are not exactly the same as those of ordinary arithmetic.*

1. *The form of a mathematical expression and the way the expression should be evaluated in actual practice may be quite different.*

Reference: Gentle

Computer Representation of Numbers

Numbers in Base 10

In the familiar decimal (base 10) system, numerical values are represented in units or powers of 10.

Now we can use the ***Basic Representation Theorem***, which says we can represent a number, k, as

$$ k = \sum\limits_{j=0}^{m} a_{j} (10)^{j} $$

for some unique integer m and some set of integer coefficients ${a_{0}, \ldots, a_{m}}$.

An Example

As an example, consider the following:

$$ 193 = 1 \ast (10)^{2} + 9 \ast (10)^{1} + 3 \ast (10)^0 $$