Day 3: Terminology

Properties of Functions

Function
A function is a representation of information. Imagine a function as a black box that takes materials and builds a house. You can put different types of materials into the box (bricks, wood, stone, etc), and the function will take those materials and build a brick house, a wood house, or a stone house:

Input	**Output**
bricks	house(bricks)
x	f(x)

Discrete
Consisting of separate, non-connected elements.
Examples:
a). A coin has two *discrete* states: heads and tails
b). Vibrating string has *discrete* vibrational states (0, 1, 2, 3...nodes) with *discrete* energies

Continuous
Consisting of connected elements (a *continuum*).
Example:
a). A ball rolling on a table has a *continuum* of position states (its position can be any one of a connected set of values)

Localized
Confined to a limited region of space. In QM, this often refers to a wavefunction that exhibits a peak, or a narrow region of high probability. This means that there are a few states that are very probable, and many states that are very improbable.

Delta Function
An infinitely narrow and infinitely high peak. In QM, if a wavefunction is represented by a delta function, then this is the most localized that the system can be. It means that you know (with certainty) the exact state of the system.

De-localized
Spread out, not localized. In QM, this often refers to a wavefunction being spread out over many possible states. In this case, you have high uncertainty, because there are many possible states that the system can occupy (as opposed to a few, very probable states)

New Terms

Wavefunction

Wavefunction "Collapse"

The Heisenberg Uncertainty Principle

Conjugate Variables

Fourier Transforms

Fourier Decomposition

Additional Notes: