EdX 6.00x Notes

Lecture 1:

- What is the difference between an Algorithm and a Program?
  - An algorithm is a conceptual idea, a program is a concrete instantiation of an algorithm.
- True or False? A computational mode of thinking means that everything can be viewed as a math problem involving numbers and formulas.
  - True.
- True or False? Computer Science is the study how to build efficient machines that run programs.
  - True
- The two things every computer can do are:
  - Perform calculations.
  - Remember the results.
- Declarative knowledge:
  - Facts or a statement of truth.
- Imperative knowledge:
  - It is how to kinds of knowledge, or methods or recipes for finding something.
- Fixed Program Computer:
  - Designed to do only a specific calculation.
- Stored Program Computer:
  - A machine that can both store and manipulate sequences of instructions.
- Turing Complete:
  - Using just 6 primitives it's possible to compute anything that's computable.
  - Anything you compute in 1 programming language you can compute in any other programming language.
- If a computer can abstract methods it can…
  - Take a description, a sequence of code that is written, and use it to create a new primitive, thereby adding to the set of primitives that the system can use.
- A program counter…
  - Points the computer to the next instruction to execute in the program.
- What does it mean when we say that "the computer walks through the sequence executing some computation"?
  - The computer executes the instructions mostly in a linear sequence, except sometimes jumping to a different place in the sequence.
- Each programming language provides…
  - A set of primitive operations.
  - Mechanisms for combining privates to form more complex, but legal, expressions.
  - Mechanisms for deducing meanings or values associated with computations or expressions.

- Syntax:
    - Determines whether a string is legal.
- Static Semantics:
    - Determines whether a (*syntactically valid*) string have a meaning.
- Formal Semantics:
    - The meaning associated with a syntactically correct string of symbols that does not have any static semantic errors
- Interpreted Languages:
    - Interpreter will walk through executing entire program.
    - Python is an interpreted language.