

Topics Covered in 6.00x  
Fall 2011  
(\* means covered since second quiz)

Linguistic issues

- Values, types, expressions variables
- Builtin types: int, float, string, list, dictionary, tuple
- Mutability and aliasing
- Control flow and iteration
- Functions and methods
- Input/output
- Recursion and environments
- Exceptions
- Polymorphism
- Classes, objects, inheritance
- Pylab

Algorithms

- Big O notation
- Exhaustive enumeration
- Guess and check
- Successive approximation
  - Newton's method
- Divide and conquer algorithms
- Binary search
- Merge sort
- Hashing
- \*Depth first search and backtracking
- \*Breadth first search
- Orders of growth
  - Exponential
  - Polynomial
  - Linear
  - Log
  - Log linear
- Amortized analysis

Simulations and modeling

- Random walks
- Monte Carlo methods
- \*Graph-based models

## Understanding data

- Building computational models

- Normal distributions, standard deviation, coefficient of variation,

- Confidence interval, confidence level

- Linear regressions

- Plotting

- \*Evaluating fits

  - Over fitting

- \*Statistical sins

  - GIGO

  - Texas sharpshooter

  - Data enhancement

  - Non-representative sample

  - cum hoc ergo propter hoc

- \*Optimization problems

  - Knapsack

  - Shortest path

  - Dynamic programming

- \*Graph problems

  - Depth first and breadth first search

  - Shortest path in graphs

  - Implicit graph generators

  - Max clique

- Software engineering

  - Debugging and testing

  - Data abstraction and inheritance

  - Program organization

  - Specifications

Anything needed to successfully complete problem sets