Max Subsequence Problem

Discuss class goals: Data Structures, Algorithms, Complexity, and Sufficient Math

Brief introductions and examples

Exponents and Logs

Card shuffling problem

Bubble Sort, Shaker Sort, counting Sort, and Random list creation

Traveling Salesperson Problem

Counting "work"

Quick Sort, Modified Quick Sort, Merge Sort, and Mostly sorted list creation

Log/Log Chart creation

Coding tricks to avoid duplication

Big-O description and categories

NP, NP Complete, Million Dollar Problems, Multiplying, Factoring, RSA Encryption

Chess, Hanoi, Traveling Salesman, SAT, Unsolvable Problems

Making a Python class with overloaded operators

Abstract Data Types/ Container Types: unordered/user\_ordered/sort\_ordered, unique/duplicate containers.

More ADTs: Car, Stack, Queue

Using the Python List container class

Infix notation, Postfix notation, InfixToPostifx, EvalPostfix

Making your own Stack class

Coordinate Transformations

Polar Coordinates (for fun)

Linked Lists of Nodes: an implementation strategy.

Insert, Exists, Retrieve, Delete, Count, Traverse

Circular linked lists

Is versus ==

Recursion: Factorial, Towers of Hanoi, maybe Fibonacci and 8 Queens

Trees. Definitions. Examples

BST trees: Implementation

2-3 Trees

AVL, 2-3-4 and 100 trees

Hash Tables. Is Prime. Hash Functions.

Collision Avoidance

Collision Handling

Advanced Hashing Strategies – quadratic probing and double hash

Using Big-O for time predictions

Advanced Recursion: Fast Maze Solving

Graphs. Definitions. Types. ADT. Examples. Storage Options. Searching

8 Puzzle Problem. 15 Puzzle Problem.

Searching a weighted graph using Dijkstra

Heaps and Priority Queues. Array storage. Keeping it N\*LogN

Big-O War Stories

When to Optimize. What to Optimize