Data Structures:

Linked Lists:

- Definition: Linear data structure where each element is a separate object
- Each node has a head (reference) and the datan | Data | Next | ->
- Single-linked list, doubly-linked list, and circular linked list
- Methods: Add-first, Traverse, Add-last, Insert after, Insert before, Delete, Iterate, Clone

Trees, Tries, & Graphs:

- Graph is a data structure that consists of: a finite set of vertices also called nodes, and a finite set of ordered pairs of the form (u,v) called an edge, not the same as (v, u) where v is the number of vertices and e is the number of edges
- Graphs are classified on the basis of: Direction (bidirectional or unidirectional) and weight (Weight is associated with edges)
- Trie is an efficient data structure for searching words in dictionaries
- Search complexity with trie is linear in terms of word or key length to be searched
- No collisions in a trie and much faster that BST O(max string length)
- Tries require a lot of extra space, common example is dictionaries due to prefix search capability
- Segment tree is usually implemented when there are a lot of queries on a set of values, involving max, min, and sum on an input range of given set.
- Implemented using an array, used when we need to find max/min/sum/product of numbers in a range

Stacks & Queues:

- A stack is a container of objects that are inserted and removed according to the last-in first-out principle. Push the item into the stack and pop the item out of the stack.
- Stack is a limited access data structures, elements can only be added and removed from the stack only at the top, recursive data structure
- Simplest application is to reverse a word
- A queue is a container of objects (a linear collection) that is inserted and removed according to the first in first out principle. Excellent example is a line of students in the food court.
- Enqueue (add to back) and dequeue (remove from front)

Heaps:

- Specialized tree-based data structure which is essentially an almost complete tree that satisfies the heap property
- Highest or lowest priority element is always stored at the root, can be regarded as partially ordered

Vectors/ArrayLists:

Hash Tables:

Algorithms:

Breadth-First Search:
Depth-First Search:
Binary Search:
Merge Sort:
Quick Sort:

Concepts:

Bit Manipulation:
Memory (Stack v. Heap):
Recursion:
Dynamic Programming:
Big O Time & Space: