Study guide for CS165 final exam (Comprehensive)

By now, you should be able to interpret or write a Java program that uses any of the items shown below.

1) Recursion
   a. Stack model for recursion
   b. Helper methods
   c. Memoization
   d. Hanoi, PentagonPark

2) Classes & Objects
   a. Classes versus Objects
   b. Class variables (static)
   c. Instance variable (non-static)
   d. Class and Instance methods
   e. Scoping of variables
   f. Class constructors
   g. Object references
   h. public versus private data and methods
   i. Getter and Setter methods
   j. Arrays of objects
   k. this keyword

3) Inheritance
   a. Super and Sub Classes
   b. extends keyword
   c. super keyword
   d. Constructor chaining
   e. Overriding methods
   f. Overloading methods
   g. Polymorphism and casting
   h. Dynamic binding
   i. instanceof operator
   j. equals and toString methods
   k. Access modifiers: private, public, protected
   l. final keyword
   m. Abstract Methods vs. Concrete Methods (differences)
   n. Sharing code via abstract class

4) Interfaces
   a. Only contains abstract methods
   b. Cannot contain concrete methods
   c. implements keyword
   d. Signature: Pure functionality (no implementation).
   e. Arrays of interface types can store any class that implements the interface
   f. Comparable

5) Data Structures
   a. Collections hierarchy
   b. Collection interface
   c. List interface
   d. Queue interface
   e. ArrayList class
   f. LinkedList class
   g. Stack class
   h. Collections class
   i. Comparable interface
   j. Comparator interface
   k. Iterators
   l. ArrayList implementation
   m. LinkedList implementation
6) **Hashing**
   a. Hashing functions
   b. Collisions
   c. Linear and Quadratic Probing, Double Hashing
   d. Separate Chaining (Hash Buckets)
   e. Dynamic Hashing – extendible

7) **Priority Queues, Heaps**
   a. Offer/add
   b. Complete binary tree
   c. Array storage
   d. maxHeap, minHeap
   e. Insert/delete
   f. HeapSort

8) **Grammars, Expressions, Parsing**
   a. Grammars / Production Rules
   b. Regular Expressions
   c. Infix, Prefix, Postfix Expressions
   d. Expression Trees
   e. Expression Evaluation

9) **Trees**
   a. Binary Trees
   b. Binary Search Trees (BST)
     ✓ Searching
     ✓ Inserting / Delete
     ✓ Inorder, Preorder, Postorder, LevelOrder Traversal
   c. B+ Trees
     ✓ Structure
     ✓ Insert / Delete
     ✓ Rotation
     ✓ Bulk loading

10) **Unweighted Graphs**
    a. Data Structures
    b. Adjacency Matrices
    c. Adjacency Lists
    d. Depth-First Traversal (DFS)
    e. Breadth-First Traversal (BFS)
    f. Topological Sort