CSCE 311 - Spring 2026:
Exam 3 Study Guide

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Learning Goals

This is an outline of the things you have learned so far. Problems on the exam will reference these, showing why these problems were selected to test your knowledge. This outline is not complete–at a minimum, material from quizzes, homeworks, and recitations may also appear.

1. From Exams 1 & 2:
   (a) Background & Definitions
   (b) Proof Techniques
   (c) Algorithmic Analysis
   (d) Recursive Optimization Paradigms:
      i. Divide & Conquer
      ii. Dynamic Programming
      iii. Greedy Algorithms
2. Huffman Encoding
3. Data Structures
   (a) Abstract Data Types
   (b) Data Structure Definition
   (c) Trees
      i. Tree Representations
      ii. Binary Search Trees
      iii. Red-Black Tree Overview
      iv. B-Trees
   (d) Disjoint Sets
4. Amortized Analysis
   (a) Usage
   (b) Methods of Amortized Analysis:
      i. Aggregate
      ii. Accounting
      iii. Potential
   (c) Examples: Queue from Two Stacks, Stack with Multipop, k-Bit Binary Counter, Dynamic Table, Disjoint Sets
5. Graph Algorithm Intro
   (a) Definition
   (b) Representation (Dynamic, Adjacency List, Adjacency Matrix)
   (c) Breadth-First Search
   (d) Depth-First Search and applications