

CSCE 311 - S25: Exam 3 Study Guide

Prof. Edward Talmage

April 16, 2025

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