Mid Term Exam Review

Date: October 11, 2025

Day: Saturday

Time: 10:00 am – 12:20 pm (Exam time limit is 2 hours, we have the room reserved for an extra 20 minutes.)

Location: **MSB 260 (Mathematical Sciences Building 260)**

Topics

Dynamic Memory Allocation
Recursion
Linked Lists
Stacks+Queues
Sorted List Matching+Binary Search+Algorithm Analysis

Corresponding Foundation Exam Questions:

A1 (DMA)
A2 (Linked Lists)
A3 (Stacks, Queues)
C1 (Alg Analysis)
C2 (Timing Problems within Alg Analysis)
D1 (Recursion)

Total Points: 100
Split Between Sections: Close to Equal (so each section is about 20 points)

Exam Aids

You will be given the Foundation Exam Formula Sheet.
NO CALCULATOR OR OTHER ELECTRONIC DEVICES!!!

Topic Outline

I. Dynamic Memory Allocation
- a. malloc
- b. calloc
- c. realloc
- d. free
- e. Use cases – one struct, array of primitives, array of struct, array of ptr to struct
- f. What if malloc, calloc, realloc fails?

II. Recursion
- a. Definition
- b. Tracing
- c. Basic Molds/Structure
- d. Fib, Fact, Power, Palindrome, etc.
- e. Towers of Hanoi Structure
- f. Floodfill
- g. Brute Force – Odometer, Combinations, Permutations, Variants
- h. Application to Linked Lists

III. Linked Lists
- a. Basic Structure
- b. How to Create a Node
- c. Insert – Front, In order, Back
- d. Delete
- e. Other Structural modifications (adding nodes, changing structure, etc.)
- f. Functions that make calculations on lists without modifications
- g. Tracing Questions

IV. Stacks+Queues
- a. Abstract Data Type Idea
- b. Stack Requirements
- c. Evaluate Postfix Algorithm
- d. Infix to Postfix Algorithm
- e. Linked List Implementation
- f. Array Implementation
- g. Queue use
- h. Linked List Implementation
- i. Array Implementation Details (remember to access items through struct pointer!)

V. Algorithm Analysis, SLMP
- a. Timing Problems
- b. Looking at Code Segments and Determining Big-Oh Run-time
- c. Details of Linear Search, Binary Search
- d. Sorted List Matching Problem – 3 solution ideas and run times
- e. Using Sweeps to Solve Problems

Sample Questions

Fall 2013 Exam 1:

https://www.cs.ucf.edu/~dmarino/ucf/transparency/cop3502/exam/Exam1-Fall13.pdf

Spring 2016 Exam 1:

https://www.cs.ucf.edu/~dmarino/ucf/transparency/cop3502/exam/Exam1-Spr16.pdf