MA/CSSE 473 Winter 2017 Exam 2 specification (Last updated January 9, 2017)

Resources allowed:

1. Download and unzip the Calculator that I have provided at http://www.rose-hulman.edu/~anderson/Calc.zip .
   See Day 19 announcements for more details.
2. No other electronic devices, including calculators, phones, MP3 players, anything with headphones or earbuds.
3. No internet connection.
4. No books or papers.

Material Covered

- **Background material from 230:**
  Recursion and mathematical induction.
  Writing and solving simple recurrence relations,
  analysis of nested loops as in Weiss chapter 5 and its exercises.
  Sequential and binary search.
  Well-known sorting methods: Insertion, selection, merge, quick, heap.
  Binary tree traversals: preorder, inorder, postorder, level order.
  Formal definitions of O(N), Θ(N), etc.
- **HW 6A - HW 8** (including the "not to turn in" problems)
- **Textbook reading:**
  Sections
  3.5 [5.2],
  4.1 [5.1],
  4.2-4.5 [5.3-5.6, 4.3],
  5.1-5.2 [4.1-4.2],
  5.3-5.5 [4.4-4.6]
- **Material from Lectures:** Days 8-18.
  In particular:
  Primality testing: Fermat and Miller-Rabin.
  Know how and why they work.
  Random prime number generation
  RSA Cryptography – how to encode and decode messages
  (need to be able to find modular inverses)
  DFS, BFS, topological sort
  Interpolation Search
  Permutation Generation:
  recursive minimal change,
  Johnson-Trotter,
  lexicographic
  Subset generation – Including Binary-reflected Gray Code
  Towers of Hanoi
  Closest Pair – divide-and-conquer algorithms
  QuickHull
  Shell's Sort
  Strassen's matrix multiplication algorithm