Coverage

- Total: 50 points; 1 min / point
- Based on lectures 1-13, suggested exercises 1-4, and project 1
- Multiple choice, short answer, and problem solving questions
Introduction and History

Definitions
- Operating system
- Job
- Batch system
- Timesharing
Introduction and History

- Definitions
  - Multiprocessing
  - Multithreading
  - Multitasking
  - Multiprogramming
  - Uniprogramming
Introduction and History

- Short answers
  - Four phases of OS history
  - OS design goals
Concurrency: Threads, Address Spaces, and Processes

- Definitions
  - Thread
  - Address space
  - Process
  - Context switch
Concurrency: Threads, Address Spaces, and Processes

- Short answers
  - Benefits of concurrency
  - Thread vs. process
  - Dispatching loop
  - Thread state diagram
Genesis: From Raw Hardware to Processes

Definitions

- Master boot record
- System call
- User mode
- Kernel mode
- Trap instruction
Genesis: From Raw Hardware to Processes

- Short answers
  - Booting sequence
  - System call sequence
  - Process creation
  - init process
CPU Scheduling

- Definitions
  - Starvation
CPU Scheduling

Short answers

- Preemptive vs. nonpreemptive scheduling
- FIFO
- RR
- SJN
- SRTF
- Multilevel feedback queues
- Lottery scheduling
Cooperating Threads

- Definitions
  - Atomic operation
  - Race condition
Cooperating Threads

- Short answers
  - Independent threads
  - Cooperating threads
  - Decision tree
Synchronization

- Definitions
  - Mutual exclusion
  - Critical section
Synchronization

- Short answers
  - Code verification (e.g. how to test a locking solution)
Implementing Mutual Exclusion

- Definitions
  - Busy waiting
Implementing Mutual Exclusion

- Short answers
  - Ways to implement locks
    - Interrupt disables
    - test_and_set operation
    - Atomic memory load and store
    - Wait queues
Semaphores and Bounded Buffer

- Definitions
  - Semaphore
Semaphores and Bounded Buffer

- Short answers
  - Semaphores vs. integers
  - Two uses of semaphores
  - P() and V() functions
More on Semaphores

- Definitions
  - Safety
  - Liveness
  - Fairness
More on Semaphores

- Short answers
  - Code verification