Midterm Study Guide

This is simply a guide of topics that I consider important for the midterm. I don't promise to ask you about them all, or about any of these in particular; but I may very well ask you about any of these, as well as anything we discussed in class or that is in the reading.

1. Beginnings and basics
   a. First generation: open shop
   b. Second generation: batch, buffering, device independence, interrupts
   c. Third generation: multiprogramming, basic protection, time sharing, layers of abstraction, virtual machines
   d. Fourth generation: mini- and microcomputers, networking
   e. functions of an operating system: process, memory, secondary storage, user interface, efficiency, reliability, maintainability, small size
   f. I/O: polling vs. interrupt-driven, DMA
   g. Types of operating systems: monolithic, kernel, process hierarchy, object oriented, client server
   h. Command interpreters and user environments for invoking programs
   i. Basic parts of kernel: first-level interrupt handler, dispatcher, interprocess communications primitives
   j. Process control block
2. Synchronization and Communication
   a. **parbegin**, **parend**
   b. **fork**, **join**, **quit**
   c. Bernstein conditions
   d. critical section problem
   e. evaluating proposed software solutions to the critical section problem
   f. software solutions: Peterson's solution, bakery algorithm
   g. hardware solutions: test and set
   h. semaphores: down, up; solving synchronization problems
   i. abstract data types, monitors; **wait**, **signal**; solving synchronization problems
   j. different ways to implement **signal**s in monitors
   k. priority waiting in monitors
   l. interprocess communication: send, receive
   m. explicit vs. implicit naming
   n. blocking (synchronous) vs. non-blocking (asynchronous) send, receive
   o. link capacity
   p. remote procedure calls
3. Scheduling
   a. short-term, medium-term, long-term schedulers
   b. metrics for scheduling: turnaround time, response ratio, waiting time, response time, external factors
   c. first come first serve algorithm
   d. Shortest process next, pre-emptive shortest process next (shortest remaining time next) algorithms
   e. Highest response ratio next algorithm
   f. Round robin algorithm, quantum
   g. Multilevel feedback queue algorithm
   h. External priority methods: worst service next, deadline scheduling, fair share scheduling