

Homework 3  
Chapters 5-9

Answer the following questions. Please submit your answers as either a text file or a PDF to your Git repository in a directory called "HW3". If you submit a text file, please make sure to wrap lines at a reasonable length (about 80 characters or so).

Each question is worth 20 points (for a total of 100 points possible on the assignment).

1. Given the list following list of processes, tell when context switches occur on a single processor system using First-come, First-served scheduling, as well as Round-Robin scheduling with a time quantum of 4ms. Be sure to note what time each context switch occurs (in milliseconds) and which process gets swapped in and which gets swapped out.

Process	Burst Time (ms)
P <sub>1</sub>	27
P <sub>2</sub>	2
P <sub>3</sub>	7
P <sub>4</sub>	12
P <sub>5</sub>	6

2. With regard to process synchronization:
  - a. Describe the readers-writers problem.
  - b. Is it safe for two readers to access shared data at the same time?
  - c. Is it safe for two writers to access shared data at the same time?
  - d. Is it safe for a reader and a writer to access shared data at the same time?
3. Describe the conditions needed for a deadlock to occur in a system. What are the three methods that can be used to deal with the deadlock problem and which of these three methods is used by most systems?
4. What is paging, and why is it a useful technique in an operating system? Describe how a TLB is used with paging. In particular, what actions must be taken when memory is accessed for which there is no entry currently in the TLB?
5. In a virtual memory system, describe what a page fault is and how the operating system handles the fault. What must the operating system do if free frame cannot be found while handling a page fault?