CS492 HW 2

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I pledge my honor that I have abided by the Stevens Honor System. ztalarick

1. **Does the busy waiting solution using the turn variable (Fig. 2-23 in the book) solves the mutual exclusion problem when two processes are running on a shared-memory multiprocessor, that is, two CPUs sharing a common memory?**
    a. No, the turn variable does not solve the MEP even when running on a shared-memory multiprocessor. Process 0 can block process 1 from being in the critical section when process 0 is not in the critical section.
2. **Five batch jobs. A through E, arrive at a computer center at almost the same time. They have estimated running times of 10, 6, 2, 4, and 8 minutes. Their (externally determined) priorities are 3, 5, 2, 1, and 4, respectively, with 5 being the highest priority. For each of the following scheduling algorithms, determine the mean process turnaround time. Ignore process switching overhead.**
    a. **Round robin**
        i. Mean Turnaround Time when Quanton = 5: 22.5
    b. **Priority scheduling**
        i. 20
    c. **First-come, first-served (run in order 10, 6, 2, 4, 8)**
        i. 19.2
    d. **Shortest job first.**
        i. 14
3. **A soft real-time system has four periodic events with periods of 50, 100, 200, and 250 msec each. Suppose that the four events require 35, 20, 10, and x msec of CPU time,**

respectively. What is the largest value of x for which the system is schedulable?

a. 12.5
b. 35/50 + 20/100 + 10/200 + x/250 <= 1. x <= 12.5

4. **Consider the following state of a system with four processes, P1, P2, P3, and P4, and five types of resources, RS1, RS2, RS3, RS4, and RS5: Using the deadlock detection algorithm described in Section 6.4.2, show that there is a deadlock in the system. Identify the processes that are deadlocked.**
    a. P1 and P4 are deadlocked
        i. P2 runs and returns its resources making A = 0231
        ii. P3 runs and returns its resources making A = 0232
        iii. P1 and P4 are deadlocked
5. **A system has four processes and five allocable resources. The current and maximum needs are as follows: What is the smallest value of x for which this is a safe state? Show your calculations using the Banker's Algorithm.**
    a. X = 1
        i. A = 00111
        ii. PD runs, A = 11221
        iii. PA runs, A = 21432
        iv. PC runs, A = 3223
        v. PD runs, all processes finish