CS 520-A: Introduction to Operating Systems

Homework Assignment # 2 (due September 27, 2017)

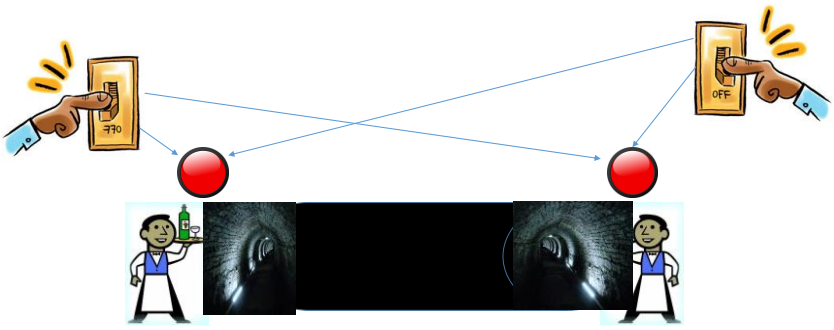
Please read Chapters 3 (sections 3.1-3.3) and 5 (5.1-5.3 and 5.5.5-5.8)) and the lecture 2notes (except for the slides (47-54) discussed in the class, and solve the problems below.

1. Prove formally that the Shortest Job First scheduling algorithm is optimal in that it minimizes the average waiting time. For simplicity, assume that 1) all *n* processes are already in the system at the time the scheduling decision has to be made and 2) all processes have arrived at the same time. Hint: Use the formula for average waiting time in the Lecture. (***25 points***)

2. Solve Problems 5.3 and 5.12.. (***15 points***)

3. The *Snooty Clam* restaurant does not take reservations. The dining room contains a single table seating twenty patrons. When space becomes free, parties are seated in the order in which they arrived, except that a party that cannot be seated in the available space is passed over. What is the effect of this seating policy on large parties? If parties are seated strictly in the order in which they arrive, how will this affect the utilization of the table? **(25 points)**

4. (This problem is related to the Lecture 1 material)



In the *Snooty Clam* restaurant, the wine cellar) lies at the end of a long narrow tunnel, which, unfortunately, is not illuminated (see the picture above. After a collision between two waiters (who entered the tunnel from opposite ends), which resulted in three broken bottles of *Gevrey Chambertin 1995* (priced at $300 a bottle), the manager installed red lights and the switches that control them at both entrances and specified the following protocol: before entering the tunnel a waiter is supposed to check if the red light is off. If so, the waiter switches it on and then enters the tunnel. Upon exiting the tunnel, the waiter switches the light off. (Either switch turns on- or off both lights simultaneously). The manager was very proud of this ingenious solution; however, on the second day of its operation, a collision occurred in the tunnel… Please explain how this could happen and suggest a working solution (you can install additional lights and switches). **(35 points)**