CS 520: Introduction to Operating Systems

Homework Assignment # 4 (due October 24, 2017)

Please read Chapter 7 and solve problems 1 through 6. (Please remember to document your solutions for the problems you have solved as clearly as possible. *Note*: If a straight [Yes or No] answer is required, make sure you provide the answer first; only then follow up with the supporting text.)

1. In the lecture, we noted that process trajectories (a two-process case) can travel only North or East. What condition prevented them from moving diagonally (i.e., North-East)? Under which condition could they move North-East? Could they move South-West?   (10 points.)

2. Solve Problem 7.15. (10 points)

3. Solve Problem 7.16   (15 points)

4. Solve Problem 7.20. (10 points)

5. In an electronic funds transfer system, there are hundreds of identical processes that work as follows. Each process reads an input line specifying an amount of money, the account to be credited, and the account to be debited. Then it locks both accounts and transfers the money, releasing the locks when done. With many processes running in parallel, there is a very real danger that having locked account x it will be unable to lock y because y has been locked by a process now waiting for x. Devise a scheme that avoids deadlocks. **Do *not* release an account record until you have completed the transactions. (In other words, solutions that lock one account and then release it immediately if the other is locked, are incorrect.)** (30 points)

6. Prove that the worst complexity of Banker's Algorithm is $O(n^2m)$, where n an m are, respectively, the number of processes and the number of resource types. (25) points)