COSC 3380 — Operating Systems

Name: Michael Osei **Due Date:** March 1 2018
Homework: Number 4

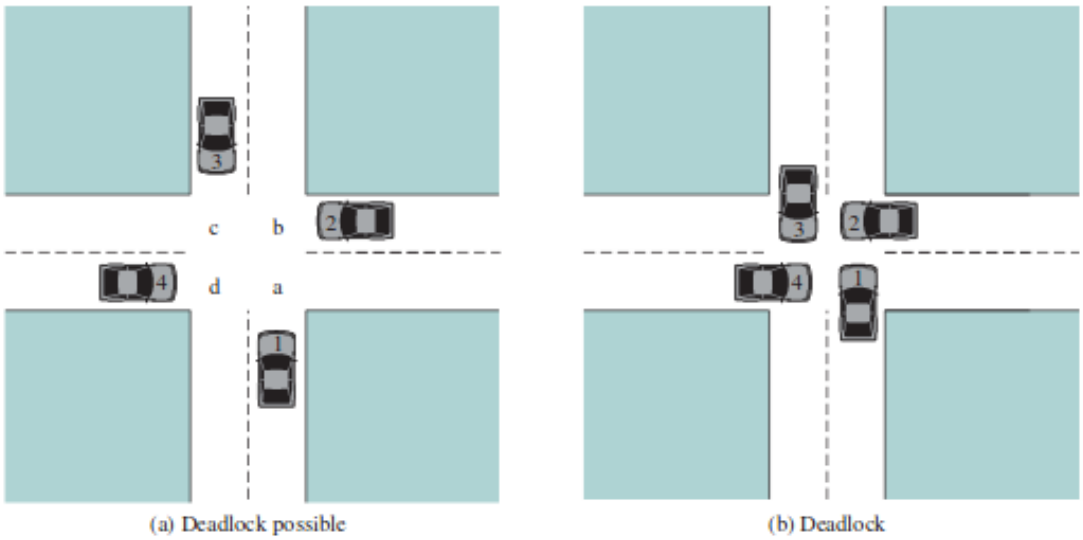

Figure 6.1 Illustration of Deadlock

Question 6.1 Show that the four conditions of deadlock apply to Figure 6.1a .

Solution

- Mutual Exclusion - Allow only one car to move throught the intersection at any given time.
- Hold & Wait - All the cars in the intersection will have to wait until the quadrant in front of each one is free for it to move.
- No Premption - The system or any other car cannot force another car to move out of its position in the intersection.
- Circular Wait - Each car will wait for the quadrant in front of it to be filled by another car. It will move into its own quadrant only when that car moves out of that quadrant.

Question 6.1 Show how each of the techniques of prevention, avoidance, and detection can be applied to Figure 6.1.

- Detection - If a deadlock is detected the car should simply reverse and wait for others to pass.

- Avoidance - Avoid deadlock by not allowing cars that may cause a deadlock to approach the intersection.
- Prevention - One of the four conditions for deadlock and the strategy for mitigation can be applied to this.
    1. Circular Wait - Assign quadrants to cars in a linear fashion.
    2. Hold & Wait - Each car should ask for the quadrants it will need ahead of time. If the quadrants cannot be provided to that car it will be blocked.
    3. Mutual Exclusion - Only one car passes at any point in time. Preferably the one to the right of each car.