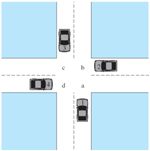
**Lab 6 homework:   
  
1) (5 pts) Consider the following diagram where Car1 needs a & b, Car2 needs b & c, Car3 needs c & d, and Car4 needs d & a. Show (explain) that each of the 4 conditions for deadlock exist.**

1. **Mutual Exclusion – Each resource (letter) is needed by at least two cars and two cars cannot share the letter**
2. **Hold and Wait – Each task can hold and wait for another car to finish in order to complete their task**
3. **No Preemption – Once each task starts, they must finish their process.**
4. **Circular Wait – These tasks are in a circular chain because each task is waiting on one from the next task.**

**2) (10 pts) Suppose you have 16GB of memory on an OS that allocates memory dynamically (i.e., multiple variable partitions), and the following sequence of allocation or freeing requests occur. Show what the 16GB of memory will look like at the end of the following sequence of allocation (all in GB) or free events based on FIRST FIT and again based on BEST FIT. Your answer should show a bar representing the 16GB with sections marked showing “in use” segments and free segments similar to Fig 4-11 in the text, except include the user ID (i.e., A-J) in the “used” segments. If there is a tie on BEST FIT, choose the first one. Assume coalescing occurs, treating adjacent free segments as one:**

**A - 3, B- 2, C-3, D-3, E-5, A-free, C-free, F-2, G-3, H-1, E-free, F-free, J-4**



**3) (10 pts) Given a task with 10 pages, and the following page trace, and a fixed Working Set Size of 4, What Will the initial and final working set be? How many page faults will occur? Assume a FIFO page replacement algorithm.  
  
0014540110300674400128001118881893506161171288030450014540012204300562235**

**4,5,3,0**

**Initial Set: 5 3 0 1**

**Final Working Set: 3 5 6 2**

**Page Faults: 33**

**Extra Credit: (10 pts avail). Complete #3 additionally with a Least-Recently used algorithm (4 pts) and a Least-Frequently used (6 pts) algorithm as well.**

**Least-Recently Used**

**Initial Set: 4 5 3 0**

**Final Working Set: 3 6 5 2**

**Page Faults: 29**