CISC 361 – Operating Systems
Fall 2020

Homework Assignment – **Semaphores**

Please submit your three C programs and a Makefile in a zip file so that when TA makes, the executables named `fork-join`, `rendezvous`, and `order` are created.

1. Question 1 of Chapter 31. Here is skeleton code fork-join.c. Refer to Fig. 31.6.

2. Question 2 of Chapter 31. Here is skeleton code rendezvous.c.

3. The pthread program order.c creates four threads, p1, p2, p3, and p4. By using the **minimum** number of semaphores, annotate the program with semaphore declarations (of type `sem_t`) and calls, `sem_init()`, `sem_wait()`, and `sem_post()`, so that no matter which order these four threads are created, the program produces either of the following outputs.

   - order #1

     ```
     I am worker 2
     I am worker 1
     I am worker 4
     I am worker 3
     ```

   - order #2

     ```
     I am worker 2
     I am worker 4
     I am worker 1
     I am worker 3
     ```