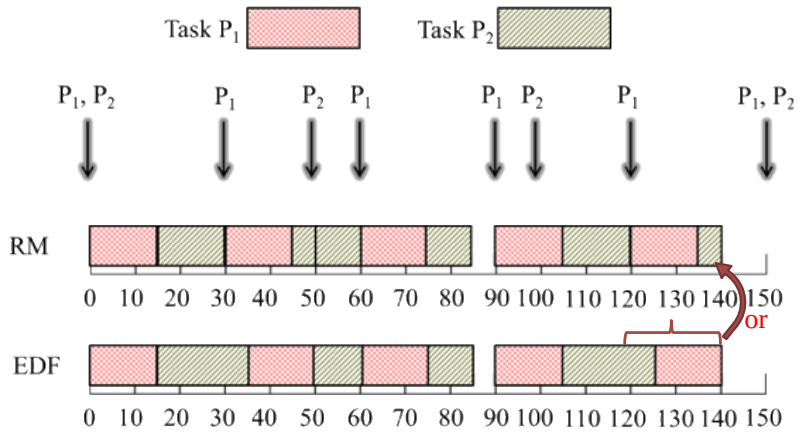
長庚大學108學年度第二學期 作業系統實務 第一次小考

系級: 姓名: 學號:

1. For two periodic tasks P_1 and P_2, P_1 has its period 30 and execution time 15, and P_2 has its period 50 and execution time 20. Assume P_1 and P_2 are ready at time 0. Please draw the scheduling results from time 0 to 150 for (a) the RM scheduling and (b) the EDF scheduling.

Answer:



2. (40%) Consider 4 tasks, t_1, t_2, t_3, and t_4 which have priorities x_1, x_2, x_3, and x_4, respectively, and assume $x_1>x_2>x_3>x_4$ (x_1 is the highest priority). After we profile the programs of the 4 tasks, we have the following information:
   - Task t_1 will lock semaphore S_1 for 3 ms.
   - Task t_2 will lock semaphore S_2 for 18 ms and lock semaphore S_3 for 16ms.
   - Task t_3 will lock semaphore S_1 for 4 ms and lock semaphore S_3 for 14 ms.
   - Task t_4 will lock semaphore S_2 for 12 ms and lock semaphore S_3 for 10 ms.

   (a) Please derive the priority ceiling of each semaphore.
   (b) Let the priority ceiling protocol be used to manage the semaphore locking, please derive the worst-case blocking time of each task.

Answer:

Priority ceilings: S_1: x_1, S_2: x_2, S_3: x_2

Worst-case blocking times: t_1: 4 ms, t_2: 14 ms, t_3: 12 ms, t_4: 0 ms.

3. (40%)
   - A sporadic server has a replenishment period 5 and an execution budget 2
   - Each event consumes the execution 1
   - Events arrive at 1, 4, 7, 9, 10
   - Please draw the diagram of the execution budget management

Answer: