Operating Systems **Homework 2**
CS4410 Summer 2011 **Due Sunday, 5 June 2011**

1 CPU Scheduling

Suppose that there are currently four processes in the Ready queue, waiting to be executed. Each process is accompanied by some information useful for the Scheduling Algorithm. More specifically, the matrix bellow shows the *Arrival Time*, the first *CPU-burst*, the first *I/O-burst* and the second *CPU-burst* for each process (the time is in microseconds):

Process	**Arrival Time**	**CPU**	**I/O**	**CPU**
P_1	0	15	20	10
P_2	1	1	10	20
P_3	5	60		
P_4	10	20	1	10

1. For the SJF Scheduling Algorithm, how much is the waiting and the turnaround time for each process?
2. How much is the average waiting time?
3. Repeat 1 and 2 for the Round Robin Algorithm with $Quantum = 10$ and $Quantum = 20$.
4. Compare the average waiting time for each algorithm and explain the differences (i.e. why the one is greater than the other?).
5. Observing the alternation of the turnaround time of each process while the Scheduling Algorithm is changing, which are two points worth mentioning?
6. What will happen if $Quantum = 60$? Which algorithm would be executed in reality? Which process would benefit from this?
7. If the process P_3 has its first response 4 microseconds after the execution of the first command, which one from the three algorithms above decreases its response time? Which quantum would minimize its response time (suppose that $Quantum \geq 1$)? What conclusion can we draw from this?

2 Programming Part

Programs p1.py, p2.py, p3.py, p4.py and p5.py need the insertion of synchronization primitives (semaphores, monitors) in order to work properly. Please, look at the programs, follow the instructions and try to fill the code-gaps.