

**HW 3 - Operating Systems**

- Three processes, p1, p2, p3, arrive at the same time and start executing using RR scheduling. p1 starts first, followed by p2, and then p3.  
The respective total CPU times of the 3 processes are 8, 3, 5 time units. The context switching time is negligible. **(10 points)**
  - Determine the average turnaround time, ATT, when the quantum is  $Q = 1$  time unit.
  - Determine the average turnaround time, ATT, when the quantum is  $Q = 3$  time units.
- Starting at time 0, a new process p of length 3 arrives every 4 time units. Starting at time 1, a new process q of length 1 arrives every 4 time units. Determine the ATT under FIFO, SJF, and SRT. **(10 points)**
- Let n processes are time-sharing the CPU, each requiring T ms of CPU time to complete. The context switching overhead is S ms. If M is the maximum time units quantum can get. **(10 points)**  
For  $n = 5$ ,  $S = 10$ , and  $M = 450$ ,  $M = 90$ ,  $M = 50$ , determine:
  - What should be the quantum size Q such that the gap between the end of one quantum and the start of the next quantum of any process does not exceed M ms?
  - The percentage of CPU time wasted on context switching
- For the 5 processes described below, draw a gantt chart showing when each process executes under FIFO, SJF, and SRT. Determine the ATT for each scheduling algorithm for the 5 processes. **(20 points)**

Process	p1	p2	p3	p4	p5
Arrival time	0	2	4	6	8
Total CPU time	3	6	4	5	2

**What to turn in Canvas:**

Solution as a pdf document.