Homework 5: Due 11/17/2022 at 11:59 PM

Your programs – if requested – must compile with gcc and execute on snowball.cs.gsu.edu! Please see https://cscit.cs.gsu.edu/sp/guide/snowball for more details. You may use whatever IDEs / text editors you like, but you must submit your responses on iCollege.

1. **(40 Points)** Let the processes P1, P2, P3, P4, and P5 be given. They arrive in the system at the same time in this order. The processes have the following service times (in time units) and priorities:

Process	**P1**	**P2**	**P3**	**P4**	**P5**
Service time (CPU burst)	10	1	3	1	2
Priority	3	1	3	4	2

   For each of the scheduling methods (First Come, first served (FIFO), Shortest Job First, Round Robin, and Priority Scheduling), specify **the execution order of the processes** and the **average execution time (average turnaround time) for all processes**. First, determine and **state the execution times of the individual processes** and then calculate the average value.

   Note:

   - For Shortest Job First, If the required service time (CPU time) is the same for two or more processes, use First Come, first served to resolve the conflict.
   - For Round Robin, the time quantum q = one time unit.
   - For Priority Scheduling, low integer priority values signify high priorities, with 0 being the highest possible priority. If multiple processes have the same priority, use First Come, first served to resolve the conflict. Also, remember that RR is pre-emptive.
   - You do not have to draw Gantt charts.

2. **(5 Points)** To not let any process wait longer than 500 ms, a system developer programs the Round Robin procedure with a dynamic time quantum size. With 'n' processes ready, the time quantum Q is set to 500 ms/n. What do you think of this scheduling strategy? (In which situations is this strategy feasible, and when is it not? Are there edge cases?) Explain your reasoning.

3. **(5 Points)** Real-time scheduling: In a system consisting of two processes, P1 and P2, suppose process P1 has a period p_1 of 50, an execution time t_1 of 25, and a deadline that matches its period (50). Further, suppose that P2 has a period p_2 of 75, an execution time t_2 of 30, and a deadline that matches its period (75). Is this real-time system schedulable under rate-monotonic scheduling? Explain your answer using the concept of overall CPU utilization and schedulability.