Enel487 – Fall 2023 – Assign 3
Real-Time Analysis

Handed Out: [2023-10-19 Thu]
Due: [2023-10-24 Tue] 23h55

1. **(10 marks)** Consider a system that has three tasks with periods: 10 millisecond, 39 millisecond, and 1 second. If the WCETs have been estimated at 4 milliseconds, 12 milliseconds, and 98 milliseconds, respectively, what is the total time-loading of the system? (We are ignoring context switch time)

   Is the task set guaranteed to have a feasible schedule, by the RMS criterion? If not, what would be the *easiest* rewrite that would make the three tasks schedulable? Explain your answer

2. **(20 marks)** A preemptive system has three concurrent tasks, described by the table below (context switch time is ignored). The background, or idle task is assumed to be nonessential and is fully preemptable by all higher priority tasks.

Task	Cycle	Execution Time	Priority
TaskA	10ms	4ms	3 (highest)
TaskB	20ms	5ms	1
TaskC	40ms	10ms	2
Idle	(continuous)	5ms	—

   (a) Answer the following:

       i. What is the system utilization?

       ii. Is this task set RMS scheduled?

       iii. What is the response time for each task?

       iv. Do all the tasks meet their deadlines? By how much does each task beat, or miss, its deadline.

v. Draw an execution time line for this system.

(b) Now suppose the priorities of Task B and C are interchanged, that is, TaskB has priority 2 and TaskC has priority 1. Answer the following:

    i. What is the system utilization?

    ii. What is the response time for each task?

    iii. Do all the tasks meet their deadlines? By how much does each task beat, or miss, its deadline.

    iv. Draw an execution time line for this system.

Submit your answers to Q1 and Q2 typeset using ASCII, or as handrwitten files scanned to PDF, your choice. The entire solution should be submitted as usual via git.