EE249 Homework 2

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1 Case 1

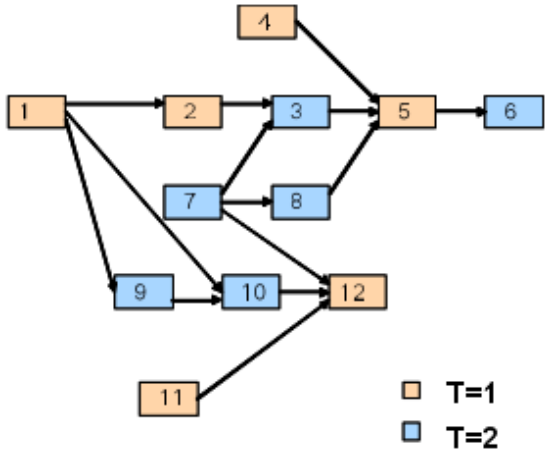
Given the following description of a system consisting of 15 tasks. (Highest index corresponds to highest priority)

Task	Period (msec)	Priority	C_i (μsec)	NOP	NLPR	NHPR	Utilization (%)
0	1000	10	1500	4	0	0	0.15
1	1000	9	5002	4	3	0	0.50
2	10-60	13	148	4	0	0	1.48
3	5-30	16	208	4	0	1	4.16
4	10-60	12	100	3	0	2	1.00
5	1000	1	131100	3	2	0	13.11
6	1000	5	150000	3	2	1	15.00
7	10-60	15	330	4	1	12	3.30
8	10-60	11	10	6	1	1	1.00
9	1000	4	100000	3	14	2	10.00
10	1000	2	120000	3	13	2	12.00
11	4	14	39	2	4	18	0.98
12	12	7	820	2	10	6	6.83
13	50	8	1000	0	0	0	2.00
14	100	6	9850	1	11	6	9.85
15	1000	3	110000	0	29	4	11.00
Column	2	3	4	5	6	7	8

- Q1: Compute the response times of tasks 5 and 10 and check their schedulability
- Q2: If the worst-case execution time of task 5 (lowest priority) is increased to 211100 microseconds, define by how much the execution time of task 3 (highest priority) should be reduced to bring the system back into schedulability conditions.
- Q3: (bonus) develop a program for the previous computations and perform the analysis of question Q1 for all tasks and of Q2 for all tasks with priority higher than 5.

2 Case 2

Given the following functional model representing a network of Simulink blocks with their worst case execution times.



Block	γ_i	Block	γ_i
F_1	0.05	F_7	0.15
F_2	0.1	F_8	0.15
F_3	0.05	F_9	0.1
F_4	0.075	F_{10}	0.15
F_5	0.1	F_{11}	0.1
F_6	0.1	F_{12}	0.075

- Q4: Define a mapping of the functional blocks into tasks and an assignment of priorities to tasks that produces a schedulable system and reduces as much as possible the need for Rate Transition blocks.