Numerical example 16 DEC 2022 at the beginning of the class.

1) Consider three periodic tasks τ1, τ2, and τ3 (having decreasing priority) that share three resources, A, B, and C, accessed using the Priority Inheritance Protocol (PIP). Compute the maximum blocking time Bi for each task, knowing that the longest duration δi,R for a task τi on resource R is given in the following table (there are no nested critical sections). (15%)

	A	B	C
τ1	3	0	3
τ2	3	4	0
τ3	4	3	6

Blocking τ1 = 9

Direct resource A: 3 (because τ2); 4 (because τ3);

Direct resource C: 6 (because τ3)

because a task can be blocked by a lower priority task only once, and blocked by a semaphore only once, the max blocking will be 3 + 6 = 9.

Blocking τ2 = 6

Direct resource A: 4 (because τ3); resource B (because τ3)

Indirect resource C: 6 (because τ3)

because a task can be blocked by a lower priority task only once, and blocked by a semaphore only once, the max blocking will be 6

Blocking τ3 = 0

2) For the task set described in Exercise 5, illustrate the situation produced by RM + PIP in which task τ2 experiences its maximum blocking time. (20%)

Max blocking for τ2 happens when τ3 just started executing section protected by semaphore C, at time instant t1. At that time instant, an instance of τ1 is released and starts executing. τ1 will suspend when entering section protected by semaphore C, at time instant t2. An instance of τ2 is released any time between time instant t1 and time instant t2.