TTK4145 Real-time programming

Exercise 10

Task 1)

Taskset	Release time	Execution
H	4	EQVE
M	2	EVVE
L	0	EQQQE

Task set 1

E= running, Q=Running with resource Q locked, V=Running with resource V locked.

Show how task set 1 executes:

- **a)** Without priority inheritance
- **b)** With priority inheritance
- **c)** With ICPP (immediate ceiling priority protocol), explain how this protocol avoids deadlocks
- **d)** With OCPP (original ceiling priority protocol), explain how this protocol avoids deadlocks, and what is the underlying mechanism in this protocol?

Task 2)

Task	Period	Exec. Time
A	50	15
B	30	10
C	20	5

Task set 2

- **a)** Show how task set 2 executes using rate monotonic priority.
- **b)** Perform the utilization test for task set 2. Is the task set schedulable?
- **c)** Perform a response time analysis for task set 2. Is the task set schedulable? If this test disagrees with the results from b), explain it?

Utilization:

$$U = \sum_{i=1}^{n} \frac{C_i}{P_i} \leq n(2^{\frac{1}{n}} - 1)$$

RTA:

$$w_i^{n+1} = C_i + \sum_{j \in hp(i)} \left\lceil \frac{w_i^n}{P_j} \right\rceil C_j$$