Solutions

Exercise 1: Response time calculations

Question 1.1:   Total load: $3/20 + 2/9 + 4/40 + 5/13 = 85.7\%$

Since the utilization based check for $N = 4$ requires the load to be less than 75.7%, we are not guaranteed schedulability by this check. Even if we recognize tasks a and c to have harmonic periods and hence can considered a family, the Liu/Layland load limit for $N = 3$ is 78.0% and cannot be met.

However, the check is just a sufficient and not a necessary condition, so the task set may be schedulable anyhow.

Question 1.2:   Using the periods, b should have the highest priority, and then d, a and c according to the RMA principle.

Question 1.3:   Manual calculations of response times:

Task	T	C	R^0	R^1	R^2	R^3	R^4
b	9	2	2	$\underline{2}$			
d	13	5	5	7	$\underline{7}$		
a	20	3	3	10	12	$\underline{12}$	
c	40	4	4	14	21	26	$\underline{26}$

Question 1.4:   In order to achieve the smallest response time, the alarm task should xcbe given the highest priority possible. Repeating the above analysis for increasingly higher prioriry of e, it turns out, that e can only be raised to the level between beetween a and c resulting in a response time of 24.

Exercise 2: RMA vs. EDF

As shown at the lectures, the following set of tasks are schedulable under EDF, but not RMA:

Task	T	C
a	3	1
b	4	1
c	5	2

Total load is 98.3%.

Another, less marginal example is:

Task	T	C
a	5	2
b	6	3
c	17	1

Here the total load is 95.9%.