SAARLAND UNIVERSITY
COMPUTER SCIENCE

Prof. Dr. Reinhard Wilhelm
Dr.-Ing. Daniel Kästner
Dr.-Ing. Florian Martin
Sebastian Altmeyer, M.Sc.
Jörg Herter, M.Sc.

Development of Safety-Critical Embedded Systems
WS 2012/2013

Exercise Sheet 9

Please hand in the solutions to the theoretical exercises until the beginning of the next lecture, Fri. 2013-02-08, 10:00. Please write your name as well as the number of your tutorial group and/or the date/time slot on the first sheet of your solution.

Exercise 9.1: Schedulability Test (Bonus Points: 1+2+4)

Consider the following periodic synchronous task-set:

Task	C_i	D_i	T_i
τ_1	2	6	6
τ_2	2	10	10
τ_3	7	40	40
τ_4	15	121	121

a) Give a tight upper bound on the number of time units for which we have to simulate in order to proof whether the task set is schedulable or not.

b) Is this task set schedulable with EDF? Justify your answer.

c) Use the response-time analysis as presented in lecture to determine whether or not the task set is schedulable with RM scheduling.

Exercise 9.2: Periodic Scheduling (Bonus Points: 3+3+3)

For each of the following tasks sets, (1) determine whether an EDF-schedule and/or an RM schedule exists, and (2) formally prove your answer.

$$\Gamma = \{\tau_1, \tau_2, \tau_3\} \qquad \begin{array}{ll} T_1 = D_1 = 3 & C_1 = 1 \\ T_2 = D_2 = 4 & C_2 = 2 \\ T_3 = D_3 = 8 & C_3 = 1 \end{array}$$

$$\Delta = \{\tau_1, \tau_2, \tau_3\} \qquad \begin{array}{ll} T_1 = D_1 = 2 & C_1 = 1 \\ T_2 = D_2 = 3 & C_2 = 1 \\ T_3 = D_3 = 4 & C_3 = 1 \end{array}$$

$$\Pi = \{\tau_1, \tau_2, \tau_3, \tau_4\} \qquad \begin{array}{ll} T_1 = D_1 = 2 & C_1 = 1 \\ T_2 = D_2 = 5 & C_2 = 1 \\ T_3 = D_3 = 8 & C_3 = 2 \\ T_4 = D_4 = 20 & C_4 = 1 \end{array}$$