Nurse scheduling

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1 Problem statement

Companies that operate 24 hours a day, seven days a week, such as factories or hospitals, need to solve a common problem: how to schedule workers in multiple daily shifts so that each shift is staffed by enough workers to maintain operations. In this next example, a hospital supervisor needs to create a weekly schedule for four nurses, subject to the following conditions:

- Each day is divided into three 8-hour shifts.
- On each day, all nurses are assigned to different shifts and one nurse has the day off.
- Each nurse works five or six days a week.
- No shift is staffed by more than two different nurses in a week.
- If a nurse works shifts 2 or 3 on a given day, he must also work the same shift either the previous day or the following day.

2 Tasks

1. Formulate and solve the nurse scheduling problem stated above.
2. So far, this has been a feasibility problem (there was no objective function). However, now we have the personnel data in Table **??**. What is the best schedule while incorporating the information in the table?
3. Finally, consider a second set of nurses in Table **??**. We now have to have two nurses per shift and at most 4 different nurses in a week, but there are some nurses that don't

like to work with other nurses (see Table **??** in the appropriate column). Find the best schedule.

Table 1: The initial data for the schedule.

Name	Regular rate per shift [DKK/hr]	Max number of shifts per week at regular rate	Overtime rate per shift [DKK/hr]
Anne	4000	4	8000
Martin	3800	6	7000
Julie	5500	5	10000
David	6000	5	7000

Table 2: Additional data for the schedule.

Name	Regular rate per shift [DKK/hr]	Max number of shifts per week at regular rate	Overtime rate per shift [DKK/hr]	Incompatibilities
Jenny	5000	3	-	Anne, Julie
Patrik	6500	6	9000	Mie, David
Mie	4500	7	8000	Patrik
Rasmus	6000	6	9000	Jenny, Anne