Exercise 1 (Logic Puzzle) [7 points]

Melanie, Nora and Pia opened a wellness business. The first week is over, each of the three women had every day between 4 and 11 clients. **How many clients exactky did each woman have on each day (Monday - Friday)?** if the following is true:
1. Melanie had more clients on Wednesday than on Monday.
2. On the day, when Pia had one more client than on Tuesday, Melanie had one more client than on Friday.
3. Nora had 5 clients on one day, it was not Thursday.
4. On the day, when Nora had one more client than on Wednesday, Melanie had one more than on Thursday.
5. On Monday both Melanie and Nora had more clients than Pia.
6. On the day (which was not Friday), when Nora had one more client than on Tuesday, Pia had one more client than on Wednesday.

Exercise 2 (Planning Encoding) [7 points]

Design and describe a SAT encoding for SAS+ planning that uses only one kind of Boolean variables – variables representing actions ($a_i^t = True$ if and only if a_i is present in the t-th step of the plan). Compute how many clauses are required for such an encoding.

Exercise 3 (Sliding Puzzle Challenge) [10(+10) points]

Implement a DIMSPEC encoder for the sliding puzzle problem. Your application should take a single command line argument – a string with the initial state of the puzzle (example: "123-480-765", goal state is always "123-456-780", "0" represents the empty slot) and print the sequence of steps required to solve it (movements of the empty slot, in the example above: "DLURD"). The puzzle will have at most 15 pieces (0123456789ABCDEF) and is not necessarily a square.

Some example inputs for testing: "023-145", "1034-9267-D5B8-E6FC", "162-530-478", "012-345-678", "876-543-210", you can create your own inputs, be careful not to create unsatisfiable ones :)

Use Stephan's DIMSPEC solver (called incplan in the IPASIR app package: `https://github.com/biotomas/ipasir`) to solve DIMSPEC files. The best solver (solving the most instances and fastest) will get a bonus of 10 points.

Exercise 4 (Sokoban Challenge) [15(+15) points]

Design and implement a DIMSPEC encoder for Sokoban (`http://en.wikipedia.org/wiki/Sokoban`). You get 15 points for any working encoding. The author of the best encoding receives additional 15 points.

- input/output format: `http://www.sokobano.de/wiki/index.php?title=Level_format`

- benchmark levels: `http://baldur.iti.kit.edu/sat/files/sokoban.zip`

- DIMSPEC solver: incplan app in `https://github.com/biotomas/ipasir`.