Logical reasoning and programming, lab session 13
(January 8, 2024)

For the following experiments use clingo. The online version of clingo is sufficient. Moreover, the examples mentioned bellow are available there. However, for further experiments, it is recommended to install clingo on your own machine. A convenient way is by using `conda install -c potassco clingo` from Anaconda or Miniconda. Anyway, be sure that you have at least version 4 which uses the ASP-Core-2 format.

Task 1: Find all minimal models of

(a) $\{p \leftarrow q. \quad q \leftarrow p.\}$

(b) $\{p \mid q. \quad r \leftarrow p.\}$

(c) $\{p \mid q. \quad r \leftarrow p. \quad s \leftarrow q.\}$

Task 2: Find all stable models of

(a) $\{p \leftarrow \text{not } q. \quad q \leftarrow \text{not } p.\}$

(b) $\{p. \quad q. \quad r \leftarrow p, \text{not } s.\}$

(c) $\{p \mid q. \quad r \leftarrow \text{not } p.\}$

(d) $\{p \leftarrow \text{not } q. \quad q \leftarrow \text{not } p. \quad p \leftarrow q. \quad q \leftarrow p.\}$

Task 3: Check the *Harry and Sally* example.

Task 4: Check the *Flying Birds* example and pay special attention to the use of negations. Try adding `bird(joe).` Does something change if we extend our knowledge by `penguin(joe)`?

Task 5: Find all the stable models of $\{p \leftarrow \text{not not } q. \quad q \leftarrow \text{not not } p.\}$

Task 6: Write a general solver for graph coloring and then check it against the *Graph Coloring* example. Assume that `n` contains the number of available colors and the input is given by predicates `node/1` and `edge/2` describing the names of nodes and edges between them, respectively. How does the solution differ from a SAT solution?

Task 7 (optional): Guess how many lines of code you need to solve the *n-queens* problem and then briefly check the solution.
Hint: The description of diagonal constraints is a well-known trick.

Task 8 (optional): Check the *Blocksworld Planning* example. You can find how the incremental solving works and a brief description of the solution in Potassco guide and further inputs in examples.