

Automatic and Interactive Reasoning

Exercise Sheet, Week 2

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Setup (AI help allowed to debug installation issues)

1. Install Python3 and the `z3-solver` package using PIP (<https://pypi.org/project/z3-solver/>).

Exercises (please solve without using AI)

1. Solve the following puzzle using Z3 ¹:

If a merchant buys 138 yards of cloth, some of which is black and some blue, for 540 roubles, how many yards of each did he buy if the blue cloth cost 5 roubles a yard and the black cloth 3?

2. Repeat the LCG experiment in *SAT/SMT by Example* (https://smt.st/SAT_SMT_by_example.pdf, Page 73) for your own C compiler (or Java). See https://en.wikipedia.org/wiki/Linear_congruential_generator for the list of corresponding constants. Keep it to 32 bits.

3. Solve the following puzzle² using Z3:

Someone in Dreadsbury Mansion killed Aunt Agatha. Agatha, the butler, and Charles live in Dreadsbury Mansion, and are the only ones to live there. A killer always hates, and is no richer than his victim. Charles hates no one that Agatha hates. Agatha hates everybody except the butler. The butler hates everyone not richer than Aunt Agatha. The butler hates everyone whom Agatha hates. No one hates everyone. Who killed Agatha?

¹https://smt.st/SAT_SMT_by_example.pdf, Page 112

²<https://decidesoluciones.es/en/challenge-nov014-who-killed-agatha-2/>