Calculator mode:

Ask student to input difficult propositional expressions they want to simplify

Get all combinations of valuations which would give a True for the expression

Change these valuations into binary number representations

First bit represents the first variable, 1 means true and 0 means false

For the simplify procedure, first merge all pairs of terms which are only one bit different, until no more new terms can be generated

The different bit can now be represented as a star, meaning that variable can take any value

The prime implicants are all terms which can not be used to generate new terms

After that, use cartesian product to get the sum of products (sop), and the set with minimum size is the simplified expressions

Finally, these binary number representations are converted back into the string representation, so that it is easier for people to read.

Exercise mode:

The questions, the difficult propositional expressions are shown, and the students are asked to construct the corresponding k maps.

After clicking “check”, the student’s answer is compared with the real answer, resulting in a “correct” or a “wrong”.

New exercises can be added by typing in, and the algorithm would compute the answer automatically.

What I learned from coding:

Understand how a k map works

Practice oop in python

New data structures including default dict and frozen set.