Tutorials for "Automated Reasoning WS24/25"
Exercise sheet 8

Exercise 8.1:
Prove by both congruence closure by rules and congruence closure by terms that the following ground equations are unsatisfiable: $f(a, g(a)) \approx f(b, g(b))$, $g(a) \approx h(c)$, $h(d) \approx g(b)$, $d \approx c$, $f(a, h(d)) \approx f(h(d), a)$, $f(b, g(b)) \not\approx f(h(c), a)$.

Exercise 8.2:
Eliminate first x_1 and then x_2 from the formula

$$\phi = x_1 \geq 0 \land x_1 + 2x_2 \leq 6 \land x_1 + x_2 > 2 \land x_1 - x_2 \geq 3 \land x_2 \geq 0 \land -2x_1 - x_2 < 4$$

and figure out that way whether $\exists x_1, x_2\, \phi$ is true.

Exercise 8.3:
Check via FM whether the following formulas are true/false:

1. $\forall x.\exists y.(2x + y > 7 \land x + y < 6)$

2. $\exists x.\forall y.(2x - y > 7 \land 2x + y > 7)$

It is not encouraged to prepare joint solutions, because we do not support joint exams.