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**Tutorials for “Automated Reasoning II”**  
**Exercise sheet 2**

**Exercise 2.1:** ( *P* )

Eliminate first  $x_1$  and then  $x_2$  from the formula

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

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

**Exercise 2.2:** ( *P* )

Prove that a LA signature  $\Sigma_{LAS} = (\{LA\}, \{0, 1, +\}, \{<\})$  is sufficient to define the missing  $\Sigma_{LA}$  symbols via axioms.

**Exercise 2.3:** ( *P* )

Check via FM whether the following formulas are true/false

1.  $\forall x \exists y, 2x + y > 7 \wedge x + y < 6$
2.  $\exists x \forall y, 2x - y > 7 \wedge 2x + y > 7$