# FAIP - Fundamentals of Artificial Intelligence Programme

## Symbolic methods in AI - Practicum

Course: FAIP - Fundamentals of Artificial Intelligence Programme, TU Delft
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This practicum focuses on three main skills.

1. Knowing how to read a formula in propositional logic and give an explanation in natural language (in this course, English).
2. Knowing how to model a natural language description of a situation in the real world into one or several formulas in propositional logic.
3. Compute the truth value of a formula given an interpretation (an assignment of the propositional variables that are in the formula).

**Exercise 1: from propositional logic to natural language.**  Write an explanation in English of each of the following propositional formulas. Do you think they accurately model real world situations?

1.1. $robot \wedge \neg can\_move$
1.2. $(percepting \vee moving) \wedge metal \leftrightarrow robot$
1.3. $organic \wedge robot \rightarrow biorobot$
1.4. $robot\_is\_moving \wedge (operator\_in\_danger \vee (operator\_requests\_stop \wedge operator\_has\_clearance)) \rightarrow \neg robot\_is\_moving$

**Exercise 2: from natural language to propositional logic.**  Write a formula of propositional logic for each of the following sentences in natural language.

2.1. A robot with a working arm can pick up fruit.
2.2. Philosophers are defined as people who love wisdom.
2.3. Spot[1] is a robot made by Boston Dynamics.
2.4. Every robot has a designer.

**Exercise 3: truth values and interpretation of a formula.**

3.1. How many propositional variables are there in the following formula?

$$robot \wedge broken\_wheels \wedge can\_move \wedge (broken\_wheels \rightarrow \neg can\_move)$$

Compute its truth table. How many rows are there in the truth table? What can you say about the number of rows of a truth table of a formula with $n$ propositional variables?
3.2. Is the formula satisfiable? If so, give an assignment of variables that makes it true. What can you conclude about the situation it models?

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[1]https://www.bostondynamics.com/products/spot