Exercise 1:

1. **Assign type** to the object (extension) denoted by a given expression:
   a) Charles, Marie, Petr, John
   b) 1, 2, π
   c) true, false
   d) >, ≥ (binary relations on numbers)
   e) The successor function on numbers
   f) Binary functions adding (+), dividing (:)
   g) 2 + 5
   h) 2 + 5 = 7, 9 > 7
   i) The set of prime numbers, the set of even numbers
   j) The set {Charles, Marie, John}

2. **Assign type** to the object (intension) denoted by a given empirical expression:
   a) student, rich student, employee, conductor
   b) to like (somebody), to kick (somebody), look at (something)
   c) calculate
   d) Adam calculates 2+5
   e) President of (something)
   f) The salary of (somebody)
   g) The highest mountain in the world, the President of CR, the richest man in the world
   h) Miss Universe 2017
   i) The speed of light, number of planets
   j) The President of CR is a tennis player

3. **Analyse** the following expressions (apply the *method of analysis*, including *type checking*):

   a) 2+5=7

   b) *Sin(π/2) = 0*

   c) {*x*| *Sin(x)=0*} (the set of numbers *x* such that the sine of *x* = 0)

   d) Adam is a student.

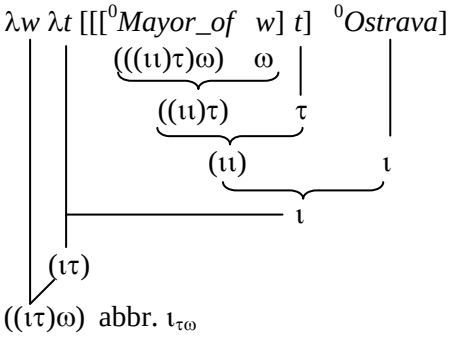
   e) Adam calculates 2+5

   f) Donald Trump is the president of USA.

Hint:
Method of analysis consists of these steps:
a) Assign *types* to objects that receive mention by the analysed expression *E*
b) Compose *constructions* of the objects obtained ad a) so that to construct the object denoted by the whole expression *E*. Semantically simple terms analyse by Trivialization of the denoted object
c) execute *type checking*, i.e., draw a derivation tree

Example of the analysis of the term „mayor of Ostrava".

a) Types: *Mayor_of*/(((ιι)τ)ω), abbr. $(\iota\iota)_{\tau\omega}$, *Ostrava*/ι, *Mayor_of_Ostrava*/$\iota_{\tau\omega}$
b) Synthesis: λ*w*λ*t* [^{0}*Mayor*$_{wt}$ ^{0}*Ostrava*]
c) Type checking:



Type checking shortened:

λwλt [^{0}*Mayor_of*$_{wt}$ ^{0}*Ostrava*]

(ιι) ι

ι

$\iota_{\tau\omega}$