

# Automata Theory: Assignment 3

Due date: January 24 (Thursday)

## Problem 1 (6 points)

Consider the following two languages on the alphabet  $\Sigma = \{a, b\}$ :

$$L_1 = \{a^n : n \geq 1\}$$

$$L_2 = \{ab^n : n \geq 0\}$$

Describe the languages below, using either the set notation or precise definitions in English:

$$L_3 = L_1^*$$

$$L_4 = L_1^+$$

$$L_5 = \overline{L_1}$$

$$L_6 = L_2^*$$

$$L_7 = L_1 \cap L_2$$

$$L_8 = L_1 L_2$$

## Problem 2 (4 points)

Consider the alphabet  $\Sigma = \{a, b\}$ . Is there any language  $L$  on this alphabet for which  $(\overline{L})^+ = \overline{L^+}$ ? If yes, give an example of such a language; if no, explain why.