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.