

CSE625 Homework 1
Due Monday, October 1

1. Give an example of INFINITE languages L_1 and L_2 over $\{a, b\}$ where $L_1 \not\subseteq L_1L_2$ and $L_2 \not\subseteq L_1L_2$. Justify your answer by giving strings in L_1 and L_2 which are not in L_1L_2 .
2. Give an example of languages L_1 and L_2 over $\{a, b\}$ where $(L_1 \cup L_2)^* \neq L_1^* \cup L_2^*$. Justify your answer by giving a string in $(L_1 \cup L_2)^*$ which is not in $L_1^* \cup L_2^*$.
3. Give an example of languages L_1 and L_2 over $\{a, b\}$ where $\overline{(L_1 \cup L_2)} \neq \overline{L_1} \cup \overline{L_2}$. Justify your answer by giving a string in $\overline{L_1} \cup \overline{L_2}$ which is not in $\overline{(L_1 \cup L_2)}$.
4. Give an example of a language L over $\{a, b\}$ where $L = L^*$ but $\overline{L} \neq (\overline{L})^*$. Justify your answer by giving a string which is in $(\overline{L})^*$ but not in \overline{L} .
5. Give an example of a language L where $L \neq LL$ but $LL = L^*$. Justify $L \neq LL$ by giving a string which is in LL but not in L .

(The grader will only grade a subset of these problems. For more practice, try Martin 1.44, 1.45, 1.46, 1.47, 1.50, 1.51.)