Automata toolbox - Homework 1

Winter semester 2023/2024

Exercise 1 (Learning regular separators)**.** Consider the following problem. Teacher knows two disjoint regular languages $L, M \subseteq \Sigma^*$ and Learner wants to find a regular separator, i.e., a language $S \subseteq \Sigma^*$ including L and disjoint from M. There are two kind of queries. 1) Learner gives a word $w \in \Sigma^*$ to Teacher, who answers whether $w \in L$ (accept), $w \in M$ (reject), or "don't care". 2) Learner gives a (DFA recognising a) separator candidate S to Teacher, who answers either "yes" if it separates L, M, or in case it doesn't Teacher answers "no" and provides either a counter-example to $L \subseteq S$ or to $M \cap S = \emptyset$.

1. Is this problem more general than Angluin's one?
2. Is there a learning protocol with polynomially many queries in the sizes of minimal DFAs for L, M?