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## CS 374 LAB 23: P AND NP

Date: April 18, 2018.

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**Problem 1.** [Category: Proof] Let us call a language  $A$  *star-closed* iff  $A = A^*$ . Show that the following problem is in P:  $\text{STAR-CLOSED} = \{\langle M \rangle \mid M \text{ is a DFA and } \mathbf{L}(M) \text{ is star-closed}\}$ .

**Problem 2.** [Category: Proof]

1. Prove that NP is closed under Kleene closure, i.e., if  $A \in \text{NP}$  then  $A^* \in \text{NP}$ .
2. Prove that P is closed under Kleene closure.

**Problem 3.** [Category: Proof] Prove that P is closed under homomorphism iff  $\text{P} = \text{NP}$ .