

---

## CS 374 LAB 23: P AND NP

Date: April 20, 2016.

---

**Announcement:** Conflict final will be held between 1:30pm and 4:30pm on May 10, 2016. If you need to take the conflict final exam, you need to inform us by end of this week (April 22, 2016).

**Problem 1.** [Category: Proof] Let us call a language  $A$  *star-closed* iff  $A = A^*$ . Show that the following problem is in P: 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  $\text{P} = \text{NP}$ .