# COMS 331: Theory of Computation
## Summer 2023

### Homework Assignment 0

Due: 11:59PM, May 19 (Friday).

**Problem 1** (20 points)

We formally define the reverse $w^R$ of a string $w$ as

1. if $w = \epsilon$, then $w^R = \epsilon$.
2. if $w = au$ for some $a \in \Sigma$ and some $u \in \Sigma^*$, then $w^R = u^R a$.

Prove: that for any strings $x, y \in \Sigma^*$, $(xy)^R = y^R x^R$.

**Problem 2** (20 points)

Prove using a proof by contradiction: If $S \cup T = T$, then $S \subseteq T$.

**Problem 3** (20 points)

Does $A^* = B^*$ imply that $A = B$? Either provide a proof or disprove it by a counterexample.