

CSC791 Week 0: Homework 0

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August 23, 2017

Problem 1

(False) Theorem 1. *All students at NC State have the same major.*

Proof. We proceed by induction:

Base case: $n = 1$. One NC State student has the same major, so the claim is true.

Induction step: Suppose the claim is true for k students, we will show that it is also true for $k + 1$ students. Label our students $S = \{x_1, x_2, \dots, x_{k+1}\}$ and split the students into two subsets: $S_1 = S \setminus \{x_2\}$ and $S_2 = S \setminus \{x_3\}$. By the induction hypothesis, all students in S_1 have the same major, and all students in S_2 have the same major. But x_1 is in both sets, therefore all students have the same major. \square