

## CS350 – Lab 1

**Due Date: February 12**

**Purpose:** We have seen some impossible Python programs. The purpose of this lab is to have you practice showing other problems are impossible by using proof by contradiction – assuming the problem can be computed and showing this leads to a contradiction.

**Knowledge:** This lab will help you become familiar with the following content knowledge:

- Using proof by contradiction to show a problem can not be computed.

**Task:** Follow the steps in this lab carefully to complete the assignments.

### Assignment 1:

Complete exercises 3.7 and 3.8 on p43 of the text.

**Criteria for Success:** You have explanations of the output for `noOnSelf` and `yesOnSelf` examples. These are not simple test cases since these two programs are problematic. Therefore your explanations need to address these complications.

Additionally you need an example for when `noOnSelf` and `notYesOnSelf` produce different outputs. Clearly explain why the example produces different results. This requires you to explain why returning 'no' could be different from not returning 'yes'.

### Assignment 2:

Complete exercise 3.10 on p43 of the text.

**Criteria for Success:** You need a complete proof by contradiction. Therefore assume that `definedOnString.py` exists. Then define a new function that uses `defineOnString` and produces a contradiction. This contradiction can be achieved by creating a function that if it is not defined on itself then it would return a legal value and would therefore be defined. Also if it is defined on itself then it would not return a defined value. These paradoxes might make your head hurt but it is a powerful tool.

### Assignment 3:

Complete exercise 3.11 on p43 of the text.

**Criteria for Success:** You need a complete proof by contradiction. Therefore assume that `longerThan10.py` exists. Then define a new function that uses `longerThan10` and produces a contradiction. This will be more fun with paradoxes.

**Assignment 4:**

Complete exercise 3.12 on p43 of the text.

**Criteria for Success:** You need a complete proof by contradiction. Therefore assume that `startsWithZ.py` exists. Then define a new function that uses `startsWithZ` and produces a contradiction. Paradoxes rock!

**Assignment 5:**

Complete exercise 3.14 on p43 of the text. Now that you have done a number of proofs by contradiction you need to see the possible flaws of these arguments.

**Criteria for Success:** You have a clear explanation of why this proof is not correct.

**Assignment 6:**

Complete exercise 3.15 on p44 of the text. This question gives a big picture, real life view of what these results might mean or not mean.

**Criteria for Success:** You have a clear explanation of how these results apply to a real life scenario.

Submit your written answers in Canvas for grading or turn in on paper assignment if your prefer.