CSE 390Z: Mathematics for Computation Workshop

QuickCheck: Structural Induction (due Monday, February 20)

Please submit a response to the following questions on Gradescope. We do not grade on accuracy, so please submit your best attempt. You may either typeset your responses or hand-write them. Note that hand-written solutions must be legible to be graded.

We have created **this template** if you choose to typeset with Latex. **This guide** has specific information about scanning and uploading pdf files to Gradescope.

0. How Many Ones?

The set T is defined as follows:

- Base case: $\epsilon \in T$

- Recursive Rules:
  If $x \in T$, then $11x \in T$
  If $x \in T$ and $y \in T$, then $x0y \in T$

Given the following recursively defined function

- numOnes$(\epsilon) = 0$

- numOnes$(11x) = 2 + $ numOnes(x)

- numOnes$(x0y) = $ numOnes$(x) + $ numOnes(y)

Prove that for all strings n in T, numOnes(n) is even

Hint: In structural induction, the structure of your induction mirrors the recursive definition.

1. Video Solution

Watch **this video** on the solution **after** making an initial attempt. Then, answer the following questions.

(a) What is one thing you took away from the video solution?

(b) What topic from the quick check or lecture would you most like to review in workshop?

(c) **Optional:** We made a solution video for Question 3 from Workshop 7 (the strong induction card game problem). If you'd like, take a look at the video and/or take a look at the posted solutions ☺.