

CSE 390Z: Mathematics for Computation Workshop

QuickCheck: 3. Formal Proof (due Tuesday, January 27)

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. Formal Proof

IMPORTANT: Wait until you learn Intro $\forall$ and Elim $\exists$ rules on Wednesday Jan 21 to start this problem.

The domain of discourse is integers. Let the predicates $\text{Odd}(x)$ and $\text{Even}(x)$ be defined as follows:

$$\text{Odd}(x) := \exists k (x = 2k + 1)$$

$$\text{Even}(x) := \exists k (x = 2k)$$

Write a formal proof of the following claim:

$$\forall x \forall y [(\text{Odd}(x) \wedge \text{Odd}(y)) \rightarrow \text{Even}(x + y)]$$

Hint: You can cite the definitions of Even and Odd as well as "Algebra" to justify your steps the same way you cite Inference Rules to justify your steps.

Hint: There aren't any "Givens" here. Start by introducing two arbitrary integers a and b , then show that $(\text{Odd}(a) \wedge \text{Odd}(b)) \rightarrow \text{Even}(a + b)$, then use the "Intro $\forall$ " rule twice.

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?