

CSE 390Z: Mathematics for Computation Workshop

QuickCheck: Negating Quantifiers (due Monday, Oct 13)

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. Negating Quantifiers

The domain of discourse is movies and actors. The following predicates are defined: $\text{Movie}(x) ::= x$ is a movie, $\text{Actor}(x) ::= x$ is an actor, $\text{Features}(x, y) ::= x$ features y .

Two of last year's TAs, Karim and Megan, have been tasked with translating the sentence "Not every actor has been featured in a movie" to predicate logic.

This was Karim's translation: $\neg \forall x (\text{Actor}(x) \rightarrow \exists y (\text{Movie}(y) \wedge \text{Features}(y, x)))$

This was Megan's translation: $\exists x (\text{Actor}(x) \wedge \forall y (\text{Movie}(y) \rightarrow \neg \text{Features}(y, x)))$

- (a) Isabel claims that Karim and Megan are both correct. Do you agree with Isabel?
- (b) Use a chain of predicate logic equivalences to prove that the two translations are equivalent.
Hint: You may wish to use DeMorgan's Law for Predicates and the Law of Implication.

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?