CSE 390Z: Mathematics for Computation Workshop

QuickCheck: Negating Quantifiers

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: Movie(x) ::= x is a movie, Actor(x) ::= x is an actor, Features(x, y) ::= x features y.

Two of your 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: $\neg\forall x(\text{Actor}(x) \to \exists y(\text{Movie}(y) \wedge \text{Features}(y, x)))$

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

(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?