

CSE 390Z: Mathematics for Computation Workshop

QuickCheck: Equivalence Proof Solutions (due Monday, January 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. Equivalence Proof

Use a chain of equivalences to show that the following proposition is a tautology (i.e. always true).

$$((p \wedge q) \vee (p \rightarrow (\neg p \wedge r))) \vee p$$

Solution:

$((p \wedge q) \vee (p \rightarrow (\neg p \wedge r))) \vee p \equiv ((p \wedge q) \vee (\neg p \vee (\neg p \wedge r))) \vee p$	Law of Implication
$\equiv (p \wedge q) \vee ((\neg p \vee (\neg p \wedge r)) \vee p)$	Associativity
$\equiv (p \wedge q) \vee (((\neg p \wedge r) \vee \neg p) \vee p)$	Commutativity
$\equiv (p \wedge q) \vee ((\neg p \wedge r) \vee (\neg p \vee p))$	Associativity
$\equiv (p \wedge q) \vee ((\neg p \wedge r) \vee (p \vee \neg p))$	Commutativity
$\equiv (p \wedge q) \vee ((\neg p \wedge r) \vee T)$	Negation
$\equiv (p \wedge q) \vee T$	Domination
$\equiv T$	Domination

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?