

CS 330 Formal Methods and Models

Quiz 4 (Fall 2010)

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Student's name:

This test is governed by the GMU Honor Code. The paper you turn in must be your sole work. Help may be obtained from the instructor to understand the description of the problem, but the solution must be the student's own work. Any deviation from this is considered a Honor Code violation.

1. [50 points]

Use DeMorgan's laws to write the negation of each of the following statements:

$$\forall x \in \mathbb{R} : (x > \frac{1}{x})$$

$$\exists x \in \mathbb{R} : (x^2 = 2)$$

$$\forall x \in \mathbb{R} : ((x > 3) \rightarrow (x^2 > 9))$$

2. [50 points]

Consider the statement given below. Write a new statement by interchanging the quantifiers \forall and \exists . State which is true: the given statement, the version with interchanged quantifiers, neither, or both. Justify your answer.

$$\forall x \in \mathbb{R} : \exists y \in \mathbb{R} : (x < y)$$