

## Quiz #3

Monday, October 2 2017

**Duration: 20 min**

**NAME:** \_\_\_\_\_

**Please write clearly and properly.**

<b>Problem</b>	<b>Grade</b>
<b>1</b>	
<b>2</b>	
<b>3</b>	
<b>Total</b>	

**Problem 1** (~ 3 points.).

(1) What are De Morgan's laws for sets?

(2) What are De Morgan's laws for logic?

(3) What are De Morgan's laws for logic for quantified propositions?

**Problem 2** (~ 2 points.). Consider the following proposition:

Some countries have trade agreements with other countries.

Express this proposition using mathematical symbols. What is its negation?

**Problem 3** (~ 4 points.). Are the following propositions true or false? *No explanations required.*

(1)  $\forall x \in \mathbb{R} \exists n \in \mathbb{N} \quad x > n$

(2)  $\exists t \in \mathbb{Z} \forall k \in \mathbb{R} \quad k > t$

(3)  $\forall x \in \mathbb{R} \forall y \in \mathbb{R} \quad (xy = 0) \rightarrow ((x = 0) \vee (y = 0))$

(4)  $\forall x \in \mathbb{R} \forall y \in \mathbb{R} \quad (xy = 0) \leftrightarrow ((x = 0) \vee (y = 0))$

(5)  $\forall x \in \mathbb{R} \forall y \in \mathbb{R} \quad (x + y)^2 = x^2 + y^2$

(6)  $\exists x \in \mathbb{R} \exists y \in \mathbb{R} \quad (x + y)^2 = x^2 + y^2$

(7)  $\forall x \in \mathbb{R} \exists y \in \mathbb{R} \quad (x + y)^2 = x^2 + y^2$

(8)  $\exists x \in \mathbb{R} \forall y \in \mathbb{R} \quad (x + y)^2 = x^2 + y^2$