

## Quiz #2

Tuesday, June 14 2016

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.** What is the truth value of each of the following statements? *No explanations are required.*

- (1)  $\exists n \in \{0, 1, 2, 3, 4, 5\} \quad n^3 = (n + 1)^2.$
- (2)  $\forall n \in \mathbb{N} \quad n \text{ is even} \Rightarrow n + 1 \text{ is odd.}$
- (3)  $\exists (x, y) \in \mathbb{R}^2 \quad y = x^2.$
- (4)  $\forall x \in \mathbb{R} \exists n \in \mathbb{N} \quad n \leq x < n + 1.$
- (5)  $\exists x \in \mathbb{R} \forall n \in \mathbb{Z} \quad x < n.$
- (6)  $\exists x \in \mathbb{R} \forall n \in \mathbb{N} \quad x < n.$
- (7)  $\forall S \in \mathcal{P}(\mathbb{N}) \quad -1 \notin S.$
- (8)  $\forall S \in \mathcal{P}(\mathbb{Z}^-) \forall S' \in \mathcal{P}(\mathbb{Z}^+) \quad S \cap S' = \emptyset.$
- (9)  $\forall x \in \mathbb{Q} \exists q \in \mathbb{Z} \quad qx \in \mathbb{N}.$
- (10)  $\forall (a, b) \in \{1, 7\} \times \{-1, 1\} \quad (a = 1) \vee (b = 1).$

**Problem 2.** Rewrite each of the following statements using mathematical symbols.

- (1) Not all real numbers are rational.

- (2) Some integers are negative.

- (3) Any rational number squares to a rational number.

(4) Any real number has a square root.

(5) Some real numbers are smaller than any positive real number.

(6) All real numbers are bounded below and above by integers.

**Problem 3.** Give a characterization of each of the following statements.

(1)  $n$  is an even integer.

(2) The equation  $ax^2 + bx + c = 0$  has no real solutions.

(3)  $x$  is an integer such that  $x^2 < 4$ .