

Math 2283 - Introduction to Logic

Quiz #1 - 2008.08.25

Solutions

1. Which among the following expressions are sentential functions, and which are designatory functions:

a) Today is Tuesday.

Sentential

b) $3x^2 - x + 1$

Designatory

c) Tuesday

Designatory

d) $3x^2 - x + 1 > 0$

Sentential

2. Replace the following sentences with ones which have the same meaning but are formulated with the help of quantifiers and variables.

a) One can find two numbers such that the absolute value of their sum is the sum of their absolute values.

$\mathbf{E}_{x,y} (|x + y| = |x| + |y|)$

b) For any number x , there exists another number y not equal to x which is equidistant from 0 on the number line.

There are many ways to write this one, here is one example:

$\mathbf{A}_x \left[\mathbf{E}_y (x \neq y \text{ and } |x| = |y|) \right]$

3. Determine if the following statements are true or false.

a) $\mathbf{A}_{x,y} \left[\mathbf{E}_z (x^2 - y < z^2) \right]$

The statement is true, for each pair of numbers x and y , one can always find a number z whose square is larger than the value of $x^2 - y$.

b) $\mathbf{E}_z \left[\mathbf{A}_{x,y} (z < x^2 + y^2) \right]$

This statement is also true. One can indeed find a value for z which is always less than the sum of two squares. For instance, and negative real number will work!