Foundations of Mathematics — Math 300 Sections 902, 905

Thursday 3 September 2020 — Concept Quiz

Answers to Concept Quiz 2.4

1. Consider the assertion: If x is a rational number, then $\sqrt{x}$ is a rational number. Which of the following is its negation:

   - × If x is a rational number, then $\sqrt{x}$ is not a rational number.
   - × No rational numbers have rational square roots
   - × There exists a rational number x such that $\sqrt{x}$ is a rational number.
   - ✓ There exists a rational number x such that $\sqrt{x}$ is not a rational number.
   - × If x is not a rational number, then $\sqrt{x}$ is a rational number.

2. Let A and B be sets. Then $A = B$ if...

   - they have precisely the same elements
   - $(\forall x \in A)(x \in B) \wedge (\forall x \in B)(x \in A)$
   - $(\forall x)((x \in A) \leftrightarrow (x \in B))$
   - $A \subset B$ and $B \subset A$. This is more properly a consequence of the definition.

3. Which of the following sentences is true?

   - × $(\forall x \in \mathbb{Z})(\forall y \in \mathbb{Z})(x + y = 0)$.
   - ✓ $(\forall x \in \mathbb{Z})(\exists y \in \mathbb{Z})(x + y = 0)$.
   - × $(\exists x \in \mathbb{Z})(\forall y \in \mathbb{Z})(x + y \neq 0)$.
   - × $(\exists x \in \mathbb{Z})(\forall y \in \mathbb{Z})(x + y = 0)$.
   - ✓ $(\exists x \in \mathbb{Z})(\exists y \in \mathbb{Z})(x + y = 0)$.