Bowdoin College

Math 2020: Introduction to Mathematical Reasoning
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Truth Value of Quantified Statements

For each of the quantified statements below, please do three things:

(1) Decide whether the statement is true or false.
(2) Justify the truth value.
(3) Write the negation, simplifying as much as possible, which means until there are no more negation signs in your answer.

To complete the problems below, you will need to watch the video on quantified statements, and the video on negating quantified statements.

1. Statement: $\forall x \in \mathbb{R},\ x^2 \in \mathbb{Q}$

Truth value:

Justification:

Negation:

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2. Statement: $\exists x \in \mathbb{Q},\ x^2 < x$

Truth value:

Justification:

Negation:

3. Statement: $\exists x \in \mathbb{R}$, so that $x^2 = 2$

Truth value:

Justification:

Negation:

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4. Statement: $\exists x \in \mathbb{R}$, so that $x^2 + 2x + 2 = 5$

Truth value:

Justification:

Negation:

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5. Statement: $\forall x \in \mathbb{Z}$, so that $x^2 = x$

Truth value:

Justification:

Negation:

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6. Statement: $\forall x \in \mathbb{Q},\ x + 1 \in \mathbb{Q}$

Truth value:

Justification:

Negation: