

Math 260

Quiz #3, due **Thursday**, April 11

You must show your relevant work and use correct notation to earn full credit!

1. Determine the truth value for each of the following statements, and be sure to explain your answer!

(a) $\forall x \in \mathbb{Z} \exists y \in \mathbb{Z} (x + 2y = 3)$

(b) $\exists y \in \mathbb{Z} \forall x \in \mathbb{Z} (x + 2y = 3)$

2. Suppose that $P(x)$ is a predicate on the set S . Using sentences, explain why $(\forall x \in S P(x)) \implies (\exists x \in S P(x))$.

3. Let $P(x)$ be the predicate $\exists y \in \mathbb{Q} (x + 3y = 3)$, with domain \mathbb{Z} . Determine the truth value of each of the following, and explain your answer.

(a) $P(7)$

(b) $-1 \in \{x \in \mathbb{Z} : P(x)\}$

4. Translate the following statement into symbols: *“Every positive real number is smaller than some integer.”*

5. Let $P(x)$ be the predicate $“x \in \mathbb{Z}^+ \rightarrow 2x + 1 = 2”$ with domain \mathbb{R} . Determine the truth value of each of the following, and explain your answer.

(a) $P(\frac{1}{2})$.

(b) $\sqrt{2} \in \{x \in \mathbb{R} : P(x)\}$.