

# Introduction to the Universal Quantifier

Consider a “for all” statement of the following form:

$$\text{For all } x \in U_x, P(x).$$

**Notation:**

**Examples:**

- Every real number  $x$  satisfies  $x^2 > 0$ .
- Given a matrix  $A$ , if  $\det A \neq 0$ , then  $A$  is invertible.
- 0 is the additive identity on  $\mathbb{R}$ .
- $\mathbb{Z}$  is closed under addition.

When is a “for all” statement true?

When is it false?

How might we prove it?