

Laws concerning quantifiers

$$\text{N1. } \neg[\forall x p(x)] \Leftrightarrow \exists x \neg p(x)$$

$$\text{N2. } \neg[\exists x p(x)] \Leftrightarrow \forall x \neg p(x)$$

Additional Laws concerning quantifiers

$$\text{U1. } \frac{\forall x p(x)}{\therefore p(c) \text{ for arbitrary } c \text{ in the universe}}$$

$$\text{U2. } \frac{\exists x p(x)}{\therefore p(c) \text{ for some } c \text{ in the universe}}$$

$$\text{U3. } \frac{p(c) \text{ for arbitrary } c \text{ in the universe}}{\therefore \forall x p(x)}$$

$$\text{U4. } \frac{p(c) \text{ for some } c \text{ in the universe}}{\therefore \exists x p(x)}$$

U1: Rule of Universal Specification

U2: Rule of Existential Specification

U3: Rule of Universal Generalization

U4: Rule of Existential Generalization