

Predicates and Quantified Statements

Universal	$\forall x \in D, P(x)$	$\exists x \in D, \sim P(x)$
Existential	$\exists (x,y) \in D, x \neq y P(x,y)$	$\forall (x,y) \in D, x \neq y \sim P(x,y)$
Universal Conditional	$\forall x, P(x) \rightarrow Q(x)$	$\exists x \in D P(x) \wedge \sim Q(x)$

$\sim$ existential = universal

$\sim$ universal = existential

More Formal Statements

Formal Contrapositive $\forall x \in D, Q(x) \rightarrow P(x)$

Formal Converse $Q(x) \rightarrow P(x) \forall x \in D$

Formal Inverse $\forall x \in D, P(x) \rightarrow Q(x)$

MQ Invalid Arguments

Quantified Converse $\forall x, P(x) \rightarrow Q(x)$

$Q(j)$ for a particular j

$\therefore P(j)$

Quantified Inverse Error $\forall x, P(x) \rightarrow Q(x)$

$\sim P(j)$ for a particular j

$\therefore \sim Q(j)$

Multiple Quantifiers

Existential MQ $\exists x \in D | \forall y \in E, P(x, y)$

Neg. MQ $\forall x \in D, \exists y \in E | P(x, y)$ [original] $\exists x \in D, \forall y \in E | \sim P(x, y)$ [negation]

Universal Modes Pones $\forall x \in Z, P(x) \rightarrow Q(x)$

$P(k)$, for a particular $k \in Z$

$\therefore \sim Q(k)$

Universal Modus Tones $\forall x \in D, P(x) \rightarrow Q(x)$

$\sim Q(j), j \in D$

$\therefore \sim P(j)$



By TheEmu001

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