Negation of quantified statements

Predicate logic

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Negation of quantified statements

Theorem

The following two statements are equivalent:

$$\neg \forall x \in U,\ p(x) \tag{1}$$

$$\exists x \in U,\ \neg p(x) \tag{2}$$

Truth-like table

$p(x)$	always	sometimes	never
$\neg p(x)$			
$\forall x \in U,\ p(x)$			
$\neg \forall x \in U,\ p(x)$			
$\exists x \in U,\ \neg p(x)$			

Corollary

Theorem

The following two statements are equivalent:

$$\neg\forall x \in U,\ p(x) \tag{3}$$

$$\exists x \in U,\ \neg p(x) \tag{4}$$

Corollary

The following two statements are equivalent:

$$\forall x \in U,\ \neg p(x) \tag{5}$$

$$\neg\exists x \in U,\ p(x) \tag{6}$$