Quantifiers

Statement	When T?	When F?
$\forall x\ P(x)$	P(x) is T for every x	One x where P(x) is F
$\exists x\ P(x)$	One x where P(x) is T	P(x) is F for every x
$\forall x\ \forall y\ P(x, y)$ $\forall x\ \forall y\ P(x, y)$	P(x, y) is T for every pair x, y	One pair x, y where P(x, y) is F
$\forall x\ \exists y\ P(x, y)$	For every x, P(x, y) is T for one y	One x such that P(x, y) is F for every y
$\exists x\ \forall y\ P(x, y)$	For one x, P(x, y) is T for every y	For every x, P(x, y) is F for one y
$\exists x\ \exists y\ P(x, y)$ $\exists y\ \exists x\ P(x, y)$	One pair x, y where P(x, y) is T	P(x, y) is F for every pair x, y

Negating Quantifiers

Negation	Equivalent Statement	When is Negation T?	When is Negation F?
$\neg\ \exists x\ P(x)$	$\forall x\ \neg\ P(x)$	P(x) is F for every x	One x where P(x) is T
$\neg\ \forall x\ P(x)$	$\exists x\ \neg\ P(x)$	One x where P(x) is F	P(x) is T for every x