Reference Sheet 4.4.
Rules of Quantificational Logic

In what follows, α/β indicates putting α for all occurrences of β, and α//β indicates putting α for some occurrences of β.

The Quantifier-Negation Laws

Q.N.	~(∀x) **F**x = (∃x) ~**F**x
Q.N.	~(∃x) **F**x = (∀x) ~**F**x
Cat.Q.N.	~(∀x)(**F**x ⊃ **G**x) = (∃x)(**F**x & ~**G**x)
Cat.Q.N.	~(∃x)(**F**x & **G**x) = (∀x)(**F**x ⊃ ~**G**x)

Universal Instantiation U.I.

(∀**x**)(… **x** …)
____
∴ (… **n**/**x** …)

No restrictions on the name **n**.

Existential Instantiation E.I.

(∃**x**)(… **x** …)
____
∴ select name **n**
∴ (… **n**/**x** …)

1. **n** is a name that has never been used before
2. **n** must first be introduced in a selection step

Existential Generalization E.G.

(… **n** …)
____
∴ (∃**x**)(… **x**/**n** …)

(… **n** …)
____
∴ (∃**x**)(… **x**//**n** …)

No restrictions on the name **n**.

Universal Generalization U.G.

:
select name **n**
:
:
(… **n** …)
∴ (∀**x**)(… **x**/**n** …)

1. The first line selects a name **n** never used before.
2. The last line is not un-representative.