**Rules of Inference for Quantified Statements**

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| Rules of Inference | Name |
| ∀*xP*(*x*)  ∴*P*(*c*) | Universal instantiation |
| *P*(*c*) for an arbitrary *c*  ∴∀*xP*(*x*) | Universal generalization |
| ∃*x P*(*x*)  ∴*P*(*c*) for some element *c* | Existential instantiation |
| *P*(*c*) for some element *c*  ∴∃*x P*(*x*) | Existential generalization |

1. In , there is no pair of angles of equal measure. If a triangle has two sides of equal length, then it is isosceles. If a triangle is isosceles, then it has two angles of equal measure. has no sides of equal length.

2. No junior or senior is enrolled in a physical education class. William is enrolled in a physical education class. William is not a senior.

3. All mathematics professors have studied calculus. Leona is a mathematics professor. Leona has studied calculus.

4. Everyone in this discrete mathematics class has taken a course in computer science and Maria is a student in this class imply the conclusion Maria has taken a course in computer science.

5. A student in this class has not read the book and everyone in this class passed in the first exam imply the conclusion someone who passed the first exam has not read the book.

Express each of the following statements using quantifiers. Form the negation of the statement so that no negation is to the left of the quantifier. Express the negation in simple English.

All dogs have fleas.

There is rabbit that knows calculus.

Every koala can climb.

Not everyone in your class has an Internet connection.

No monkey can speak French.

There is a pig that can swim and catch fish.

Some students are not asking doubts.

Some students are asking doubts.