Try it...

What’s a possible domain of discourse for these lists of predicates?

1. “$x$ is a cat”, “$x$ barks”, “$x$ likes to take walks”

2. “$x$ is prime”, “$x=5$” “$x < 20$” “$x$ is a power of two”

3. “$x$ is enrolled in course $y$”, “$y$ is a pre-req for $z$”

Translations

“For every $x$, if $x$ is even, then $x = 2$.”

“There are $x, y$ such that $x < y$.”

\[
\exists x \ (\text{Odd}(x) \land \text{LessThan}(x, 5))
\]

\[
\forall y \ (\text{Even}(y) \land \text{Odd}(y))
\]
Quantifiers

Writing implications can be tricky when we change the domain of discourse.

For every cat: if the cat is fat, then it is happy.

\[ \forall x [\text{Cat}(x) \land \text{Fat}(x) \rightarrow \text{Happy}(x)] \]

Domain of Discourse: cats

What if we change our domain of discourse to be all mammals? We need to limit \(x\) to be a cat. How do we do that?

\[ \forall x [\text{Cat}(x) \land (\text{Fat}(x) \rightarrow \text{Happy}(x))] \]

Universal Quantifier

“\( \forall x \)”

“for each \(x\)”, “for every \(x\)”, “for all \(x\)” are common translations
Remember: upside-down-A for All.

Existential Quantifier

“\( \exists x \)”

“there is an \(x\)”, “there exists an \(x\)”, “for some \(x\)” are common translations
Remember: backwards-E for Exists.