Nested Quantifiers

Let our domain of discourse be $\{A, B, C, D, E\}$

And our proposition $P(x, y)$ be given by the table.

What should we look for in the table?

$\exists x \forall y P(x, y)$

$\forall x \exists y P(x, y)$

y (columns), x (rows)

$P(x,y)$	A	B	C	D	E
A	T	T	T	T	T
B	T	F	F	T	F
C	F	T	F	F	F
D	F	F	F	F	T
E	F	F	F	T	F

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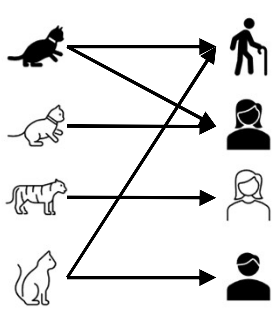
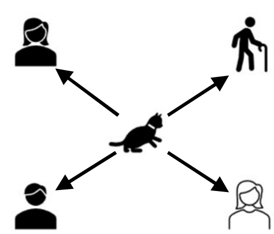
Try it yourselves

Every cat loves some human.



There is a cat that loves every human.



Let your domain of discourse be mammals.
Use the predicates `Cat`(x), `Dog`(x), and `Loves`(x, y) to mean x loves y.

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Integer

We need a basic starting point to be able to prove things.

Objects to work with.

An <u>integer:</u> is any real number with no fractional part.

Some **definitions** to analyze

Even	Odd
`Even(x)` := An integer, x, is even if and only if there is an integer k such that $x = 2k$.	**`Odd(x)` := An integer, x, is odd if and only if there is an integer k such that $x = 2k + 1$.**

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Our First Direct Proof

Prove: "For all integers x, if x is even, then x^2 is even."

What's the claim in logic?

How would we prove this claim?

We'll see how to prove it formally in a minute; for now, just try to convince each other this statement is true.

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