Translating English into Predicate Logic — A summary

Oct 15

Every .../All.../Each.../Any x.../ $(\forall x \ldots)$

Some.../At least one.../There exists a.../ $(\exists x \ldots)$
There is a.../

None.../No x.../ $(\neg(\exists x \ldots))$

Not every.../Not all... $(\neg(\forall x \ldots))$

Every P-ish x.... $(\forall x\ P(x) \rightarrow \ldots)$

Some P-ish x.... $(\exists x\ P(x) \wedge \ldots)$

At least one P-ish x $(\exists x\ P(x))$

At most one P-ish x
If there are two P-ish things, they are the same.
$(\forall x(\forall y\ ((P(x) \wedge P(y)) \rightarrow (x=y))))$
There does not exist two different P-ish things.
$(\neg(\exists x(\exists y\ ((P(x) \wedge P(y)) \wedge x \neq y))))$

Exactly one P-ish x = (at least one) $\wedge$ (at most one)

At least two different P-ish things
$\exists x\ \exists y\ \ P(x) \wedge P(y) \wedge x \neq y$

At most two (different) P-ish things
$\forall x\ \forall y\ \forall z\ \ (P(x) \wedge P(y) \wedge P(z)) \rightarrow ((x=y) \vee (y=z) \vee (z=x))$
$\neg(\exists x\ \exists y\ \exists z\ \ P(x) \wedge P(y) \wedge P(z) \wedge (x \neq y) \wedge (y \neq z) \wedge (z \neq x))$

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Oct 16

Additional exercises taken from Collin Roberts' Lecture Notes

$Stu(x)$: x is a student
$Prof(x)$: x is a professor
$E(x)$: x is enrolled in y.
$T(x, y)$: x teaches y.
$C(x)$: x is a course
$Math(x)$: x is a Math course
$CS(x)$: x is a Computer Science course

Every Computer Science course is a Math course.

Not every Math course is a Computer Science course.

There is a student who is enrolled in a course

There is a student who is enrolled in a Computer Science course

Some professor does not teach any course.

Any professor cannot be a student.