proposition: predicate w/o quantifier is not a proposition (i.e. x = 0 w/o for all/there exists x is not a proposition) rows = 2^n, n = num of predicates

nega: ***always*** negate quantifiers when writing out translation

quantifier/logic translation: ***always*** use:

quantifier scoping:

Distributing quantifier:

Nested quantifier: demorgan is done one layer after another:

Only distribute

Useful demorgans/equivalence laws:

De Morgan's Law for quantifiers:

A close-up of a math test

Description automatically generated

De Morgan's Law:

Definition of →:

Idempotent Laws:

Distributive Law:

Absorption Laws:, this is because only needs at most one to be true

Impl breakout/contrapos: (***always breakout first to simplify stuff***)

Nega impl:

A table of mathematical equations

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Tautology/must be true

Contradiction/must be false

Satisfiable/can have one case to be true

counterexamples think:

, false, x cannot be (should also check for zero)

, false, x can be a fraction.

, false,

Proof 101:

***always*** prove/disprove for all instead of there exists, then let vars be arb. type of num

***to disprove*** P(x)=prove (is true)

Proof:

by contradiction: seeking contradiction, assume the (negation), there is a contradiction, thus original is true

by cases: blah, then (WLOG) all cases exhausted

by contrapos: assume contrapo

truth table finding: if mostly false, then its , ; if mostly true, then its ; if its half false & true, then its

Sets:

Cardinality: num of elements in a set. Just be careful with which one gets subtracted from

Power set: every single possible combos of sets including

disjoint sets

minus:

Sets proof 101:

Subset method: show that each side of the identity is a subset of the other side.

Proper subset: , A is a subset of B, and A and B are not the same set.

Inclusion-exclusion principle: Only applies to cardinality

***More counterexamples for rational*** / irrational , which is irrational times irrational making a rational

Counterexamples for positive / negative,

***Prime*** numbers > 2 are odd. Or prime numbers only divide themselves and 1.

Tautology can always be satisfiable.

Satisfiable cannot always be tautology.

Madeleine’s OH equations:

A screenshot of a cell phone

Description automatically generated