

Vacuous truth
 $\forall x, P(x) \rightarrow Q(x)$
 truth set of $P(x)$
 all x that make P true
 if $P(x)$ truth set is empty
 then $P(x) \rightarrow Q(x)$ is true

Sep 17-9:59 AM

$p \rightarrow q \quad \neg p \vee q$
 neg. $p \wedge \neg q$
 converse $q \rightarrow p$
 contrapositive $\neg q \rightarrow \neg p$
 inverse $\neg p \rightarrow \neg q$
 neg. inv. $\neg(\neg p \rightarrow \neg q)$
 $\neg(\neg p \vee \neg q)$
 $\neg p \wedge q$

 $p \leftrightarrow q \equiv p \rightarrow q \wedge q \rightarrow p$

Sep 17-10:09 AM

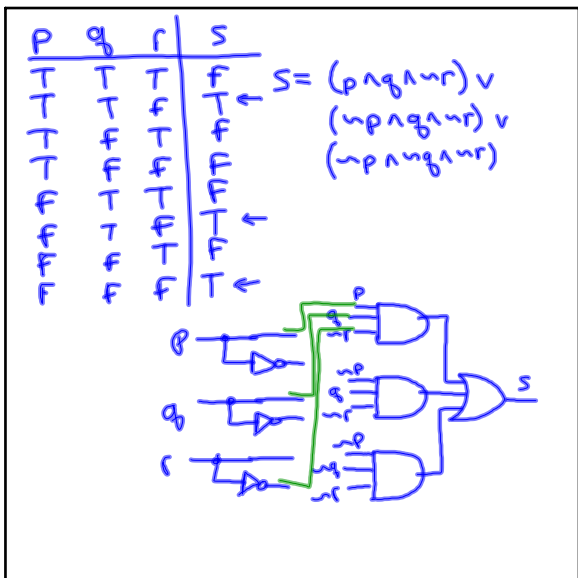
Everybody doesn't like something.
 $Likes(x,y)$
 $\forall x \in \text{People}, \exists y \in \text{Things s.t. } \neg Likes(x,y)$
 neg. $\forall / \equiv \exists x \in P \text{ s.t. } \forall y \in T, Likes(x,y)$
 $\exists y \in T \text{ s.t. } \forall x \in P, \neg Likes(x,y)$
 There is something that everyone
 doesn't like.

Sep 17-10:15 AM

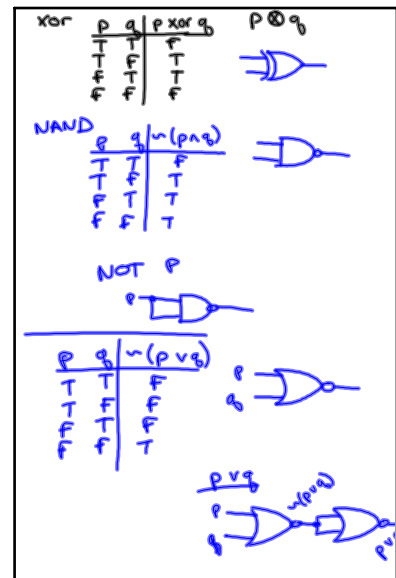
Any sum of two rational numbers
 is rational
 The sum $r+s$ is rational
 \therefore The numbers r and s are rational

 $R(x): x$ is rational
 $S(x,y): x+y$ is rational
 $\forall x,y \quad R(x) \wedge R(y) \rightarrow S(x,y)$
 $S(r,s)$
 $\therefore R(r) \wedge R(s)$

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