

$P(x): x > 7$   
 $\forall x \in \mathbb{Z}, P(x)$  false  
 $\exists x \in \mathbb{Z}$  s.t.  $P(x)$  true

Sep 10-9:59 AM

Negations  
 $\sim(\forall x \in D, Q(x)) \equiv \exists x \in D$  s.t.  $\sim Q(x)$   
 $D$ : set of all hamsters  
 $Q(x)$ :  $x$  is green

Sep 10-10:11 AM

$\sim(\exists x \in D$  s.t.  $Q(x)) \equiv$   
 $\forall x \in D, \sim Q(x)$   
 $D$ : all flies  
 $Q(x)$ :  $x$  is on the wall  
 negation: all flies are not on the wall  
 OR  
 There are no flies on the wall.

Sep 10-10:14 AM

$P(x) \Rightarrow Q(x)$   $P(x)$ :  $x$  is a math book  
 $\forall x, P(x) \rightarrow Q(x)$   $Q(x)$ :  $x$  is expensive  
 $D$ : Books  
 $\sim(\forall x, P(x) \rightarrow Q(x)) \equiv$   
 $\exists x \in D$  s.t.  $\sim(P(x) \rightarrow Q(x)) \equiv$   
 $\exists x \in D$  s.t.  $\sim(\sim P(x) \vee Q(x)) \equiv$   
 $\exists x \in D$  s.t.  $\sim(\sim P(x) \wedge \sim Q(x)) \equiv$   
 $\exists x \in D$  s.t.  $P(x) \wedge \sim Q(x)$

Sep 10-10:17 AM

$D$ : books  
 $P(x)$ :  $x$  is on the chair  
 $Q(x)$ :  $x$  has four legs  
 $\forall x \in D, P(x) \rightarrow Q(x)$   
 truth set is empty  
 vacuously True

Sep 10-10:24 AM

$D$ : students  
 $P(x)$ :  $x$  is in CS201  
 $Q(x)$ :  $x$  will have a test on 9/20  
 $\checkmark \forall x \in D, P(x) \rightarrow Q(x)$   
 $\checkmark \forall x \in D, \sim Q(x) \rightarrow \sim P(x)$  contra positive  
 $\times \forall x \in D, Q(x) \rightarrow P(x)$  converse  
 $\times \forall x \in D, \sim P(x) \rightarrow \sim Q(x)$  inverse

Sep 10-10:31 AM

All students take a class.  
some classes

S: students  
 C: classes  
 P(x,y): x takes y

$\forall x \in S, \exists y \in C \text{ st. } P(x,y)$

There is a student who takes all classes.  
 $\exists x \in S \text{ st. } \forall y \in C, P(x,y)$

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$\exists y \in C \text{ st. } \forall x \in S, P(x,y)$

There is some class that contains all students.

Sep 10-10:41 AM