

Assignment #4 due Wednesday 9/28 by 5pm

Exam 1 covers chapters 1, 2, 3 Assignments 1, 2, 3, 4  
scheduled for Friday 9/30

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Send drafts of homework to Dropbox from now on  
rather than email.

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### Quick Summary

Subsets Def  $A \subseteq B$  when  $(\forall x)(x \in A \rightarrow x \in B)$

To prove that  $A \subseteq B$ , there are 3 basic strategies.

Direct Proof assume  $x \in A$ , show  $x \in B$

Contrapositive assume  $x \notin B$ , show  $x \notin A$ .

Contradiction Assume  $x \in A$  and  $x \notin B$ , find a contradiction.

### Implications

To prove that  $P \rightarrow Q$ , there are 3 basic strategies.

Direct Proof Assume  $P$  is true, show  $Q$  is true.

Contrapositive Assume  $Q'$  is true, show  $P'$  is true.

Contradiction Assume  $P \wedge Q'$  is true, find a contradiction.

## Set equality

To show that  $A=B$ , show that  $A \subseteq B$  and  $B \subseteq A$ .

## Logical Equivalence

To show that  $P \leftrightarrow Q$ , show that  $P \rightarrow Q$  and  $Q \rightarrow P$

## Template for #5 on Assignment #4

We are proving that

$(B-A) \cup A = B$  if and only if  $A \subseteq B$ .

( $\rightarrow$ ) Assume  $(B-A) \cup A = B$  and prove  $A \subseteq B$ .

OR

Assume  $A \not\subseteq B$  and prove  $(B-A) \cup A \neq B$ . \* I would use Dis.

OR

Assume  $(B-A) \cup A = B$  but  $A \not\subseteq B$  and find contradiction

( $\leftarrow$ ) Assume  $A \subseteq B$  and prove  $(B-A) \cup A = B$ . \* I would use Dis.

OR

Assume  $(B-A) \cup A \neq B$  and prove  $A \not\subseteq B$ .

OR

Assume  $A \subseteq B$  and  $(B-A) \cup A \neq B$  and find a contradiction