

# Showing Statements

## Assumptions

- Assume  $P$  holds
- Then  $P$  is True

## AND

- Prove  $P$  is True
- Prove  $Q$  is True
- Therefore, ' $P$  and  $Q$ ' is True.

## OR

- Prove  $P$  is True or  $Q$  is True (no need to prove both).
- Therefore, ' $P$  or  $Q$ ' is True.

## NOT

- Assume  $P$  holds
- Therefore,  $P$  is True.
- Use this fact in a subsequent proof to create a contradiction.
- Therefore, ' $\text{not } P$ ' is True.

## Implies

- Assume  $P$  holds
- Therefore,  $P$  is True.
- Use this fact in a subsequent proof to find that  $Q$  is True.
- Therefore, ' $P$  implies  $Q$ '

## For All $x$

- Let  $o$  be an arbitrary object
- Prove that  $P(o)$  holds without using a specific value for  $o$
- Therefore,  $P(o)$  holds for all values of  $o$
- Therefore, it works for all  $x$

## There exists an $x$

- Let  $o$  be a specific object
- Prove that  $P(o)$  holds
- Therefore, 'there exists an  $x$  such that  $P(x)$  holds'