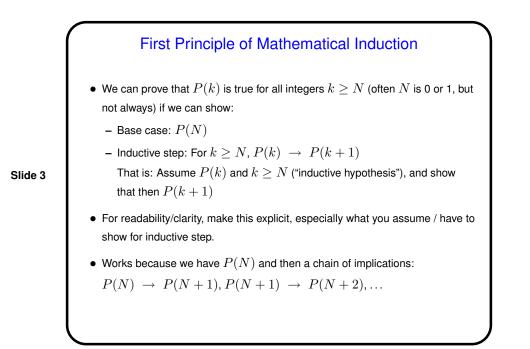


Proof Techniques, Review/Recap
To disprove "for all integers n, P(n)" just need one counterexample. To prove, must show true for all n.
Techniques so far for proving P → Q:

Exhaustive proof: Consider all possible cases where P is true.
Direct proof: Assume P and derive Q.
Proof by contraposition: Assume Q' and derive P'.

Proof by contradiction: Assume P ∧ Q' and derive "contradiction" (something impossible).

Slide 2



First Principle of Mathematical Induction — Examples

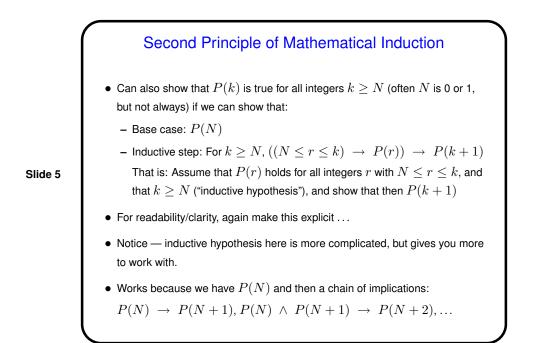
• Example: Show that for  $n \ge 1$ ,

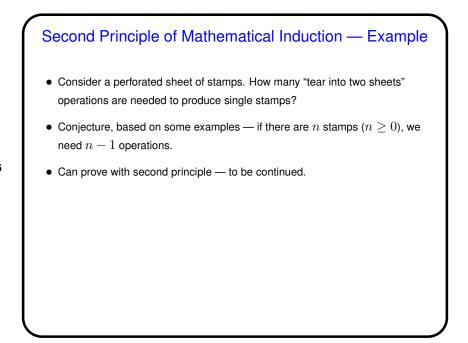
• Example: Show that for  $n \ge 1$ ,

$$\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$$

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$$\sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}$$





Slide 6

