

Intro to Discrete Structures

Lecture 8

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Proof Strategy

- We have seen two important methods for proving theorems of the form $\forall x(P(x) \rightarrow Q(x))$.

These two methods are

- the direct proof and
- the indirect proof

methods.

- It takes some practice (solving homework problems) to learn to recognize quickly the correct approach.
- Try first the direct approach. If it does not work then try the indirect approach.

Direct or Indirect Proof?

Definition: The real number r is **rational** if there exist integers p and q with $q \neq 0$ such that $r = p/q$.

Example 7: Prove that the sum of two rational numbers is rational.

$$r = \frac{p}{q} \quad \tilde{r} = \frac{\tilde{p}}{\tilde{q}}$$
$$r + \tilde{r} = \frac{p}{q} + \frac{\tilde{p}}{\tilde{q}} = \frac{p\tilde{q} + \tilde{p}q}{q\tilde{q}}$$

direct proof