Session 49: Structural Induction

- Principle of structural induction
- Examples

Structural Induction

To prove a property of the elements of a recursively defined set, we use **structural induction**.

BASIS STEP: Show that the result holds for all elements specified in the basis step of the recursive definition.

RECURSIVE STEP: Show that if the statement is true for each of the elements used to construct new elements in the recursive step of the definition, the result holds for these new elements.

- The validity of structural induction can be shown to follow from the principle of mathematical induction.

Example

Theorem: $l(xy) = l(x) + l(y)$, where x and y belong to Σ^*, the set of strings over the alphabet Σ.

Example

Theorem: Every well-formed formula for compound propositions contains an equal number of left and right parentheses.

Summary

- Principle of structural induction
- Structural induction on strings
- Structural induction on well-formed formulae