

An improved structural induction template

Problem: Prove that every *recursive structure* φ has *property* P .

Define $P(\varphi)$ to be *the property in the problem*.

Theorem: For every *recursive structure* φ , φ has *property* P .

Proof by structural induction:

Base case: For every base case you identified, prove that the *recursive structure* φ has *property* P .

Induction step: For each *recursive case* you identified, write an *induction step*

Recursive case 1:

Induction hypothesis: Assume *each recursive appearance of the structure* has *property* P .

Prove that the *recursive structure* φ has *property* P using the induction hypothesis.

Recursive case 2:

(State the induction hypothesis and use it to prove the theorem.)

(Possibly more recursive cases)

By the principle of structural induction, every *recursive structure* φ has *property* P .

QED