

Chapter 2 - Induction

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Weak Induction

Want to prove a statement for all rational numbers n (starting at $n = 0$ or $n = 1$).

2 steps:

1. Base Case prove statement for smallest value of n where it's defined ($n = 0$ or $n = 1$).
2. Induction Step for each n , must show that if the statement is true for n , it's true for $n + 1$.

This proves the result for all n .

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Suppose you have infinite dominoes.

Base case: the first dominoes gets knocked over

Induction step: since we know that if n th domino gets knocked over, the $n + 1$ th domino gets knocked over

The entire series of dominoes gets knocked over.

Proof

Suppose we completed both steps, but that statement is not true for all values. Let $m + 1$ be the smallest value where statement fails. Then since completed base case, the statement works for m . But the induction step implies that the statement works for $m + 1$, which is a contradiction.