MATH 335 Lecture 2

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Induction recap: base case(s).
Weak induction show true for n=k then prove true for n=k+1
Strong induction show true for $n \leq k$ and prove true for n=k+1

Recursion and divide and conquer

Definition 0.1. Reduction: Converting a problem x into a problem Y where we already have a " black box" algorithm for Y

Recursion is a reduction to a smaller insatnce of the same problem.

Proving towers of hanoi recursive function via induction:

The function Hanoi runs correctly on n disks forall n $\geq$ 1. Base case is n=1, then show n+1
Inductive step: Assume all recursive calls are correct.

$$F_e = \frac{k|q_1||q_2|}{r^2}$$

$$F_e = \frac{k|q_1||q_2|}{(2r)^2} = \frac{k|q_1||q_2|}{4r^2} = \frac{1}{4}\left[\frac{k|q_1||q_2|}{r^2}\right] = \frac{1}{4}F_e$$