CSI 35 LECTURE NOTES (Ojakian)

Topic 3: Strong Induction and Well Ordering

OUTLINE

(References: Wells 102-104, Rosen: 5.2)

1. Strong Induction
2. Well-Ordering

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1. Strong Induction
   (a) Example 1 (about ladders)
   (b) Example 2: Write every integer (greater than 1) as a product of primes.
   (c) Example 4: Prove that every amount of postage of 12 cents or more can be formed using just 4-cent and 5-cent stamps (note: can do with usual induction too).
2. Mistakes in Strong Induction
   (a) Exercises 29, 30, 32
3. Well-ordering and why induction works?
   Every non-empty subset has a least element.
   (a) Smallest counter-example for natural numbers. For integers? For reals?
   (b) Example. Chap 5 Supplementary: 52.
   (c) Main Point: Well-ordering principle $\Rightarrow$ Induction Principle.
4. Exercises
   (a) Basic: 1, 2
   (b) Stamp-like questions: 3 - 8
   (c) Miscellaneous: 10 (bar breaking), 12 (powers of two)