

I. Homework Assignments:

- 1.) Read next two chapters of *Natural Computing*
 - a. David Shaw
 - b. Jonathan Mills
- 2.) Puzzle Two “The Tower of Lego,” in *The Puzzling Adventures of Doctor Ecco*

II. Sorted Lists (see examples below)

- 1.) sorted by key, not value
- 2.) keys are not dense
 - a. for example, in a list of 10,000 items, item 7013 may not be in position 7013
 - b. this also means there could be an item 70,000 in a list of 10,000 items
- 3.) Binary Search
 - a. looks at middle key, continues to limit search space by half
 - b. like number guess game
 - c. tree structures are more efficient, but work in a similar way

Key	2	7	13	15	16	17	25
Value	20	75	-20	--	--	--	--

III. Puzzle

- 1.) 1000 gigantic lego pieces 1 meter tall
- 2.) must build a tower of height 1 kilometer
- 3.) it takes 1 week to combine 2 towers of appropriate length (>100) together
- 4.) what is the inherent limit of how fast it can be built?
- 5.) logarithmic limit - it will take $\log_2 1000$ weeks to build
- 6.) if the goal height was 64, it would take $\log_2 64 = 6$ weeks to build

Height	2	4	8	16	32	64
Week	1	2	3	4	5	6

IV. Worst Case Analysis

1. can a respondent force a questioner to take at least $\log_2 1000$ questions while remaining consistent?
2. in any given outcome (with the 2 outcomes \geq and $<$), lower bound is $\log_2 1000$ given worst case analysis
3. you want to find an algorithm that meets lower bound