Tutorial 7: CS21003 Algorithms I

Prof. Partha Pratim Chakrabarti and Palash Dey
Indian Institute of Technology, Kharagpur

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1. Consider the selection algorithm which is the same as randomized selection that was taught in the class except that the pivot is chosen as the first element of the array. Show that the average case time complexity of this algorithm if $\mathcal{O}(n)$.
2. Show that any comparison-based algorithm for finding the median must use at least $\Omega(n)$ comparisons.
3. Prove that, in the Towers of Hanoi problem, we need at least 2^n moves to move a stack of n disks from one tower to another.
4. Design a data structure for a dynamic set that supports insert and delete-median operations $\mathcal{O}(\log n)$ time and find-median operation in $\mathcal{O}(1)$ time.