A Brief Introduction to Algorithms, Complexity, and Computability

by Matt Patitz

Slides 1-7

(20-30 minutes) Write algorithm to describe how to draw shape/figures: Give instructions which only use line lengths, point locations, directions, and/or angles to guide someone to draw the shape/figure which you are given. Give out graph paper with different shapes and blank graph paper. Now switch just instructions, not shape, and see if you can draw the shape.

* Ask how many people’s instructions were executed correctly? 5/18
* Who wrote succinct instructions? Read a few of them.
* Pseudocode that is between English and a programming language

Slides 9-

Finding an array max

Comparing algorithms:

Time and space

Y2K

Linear search

O(n)

Types of Analysis

Recursive example and write factorial version

Searching

Linear search

Binary search

Sometimes it is more efficient to sort then search. Why? If you are searching a lot! Binary sort O(n\*log(n)) and search is O(log(n))

Linear search O(n) mn

Binary O(nlogn) + O(mlogn)

mn > nlogn + mlogn

For n=10^6 (n=number of records), m>6 (m is number of searches)

Handed out average, worst

Bubble sort

Selection sort

Insertion sort

Merge sort

Quicksort

Heapsort