Lecture 8

CSE 331

Sep 12, 2014

HW 1 due today

Place Q1, Q2 and Q3 in separate piles

I will not accept HWs after 1:15pm

Other HW related stuff

HW 2 has been posted online: see piazza

Solutions to HW 1 at the END of the lecture

Clarification on collaboration

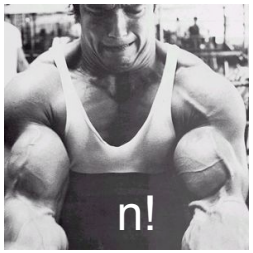
You can collaborate with up to 2 other folks in each HW

You can change your group from one HW to another HW but not on the same HW

Collaboration is interpreted as **any** discussion on the HW problems beyond the problem definition

even if you ignore the discussion in your final writeup

Main Steps in Algorithm Design



Problem Statement

Problem Definition

Algorithm

"Implementation"

Analysis

Correctness Analysis

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Definition of Efficiency

An algorithm is efficient if, when implemented, it runs quickly on real instances

Implemented where?

Platform independent definition

What are real instances?

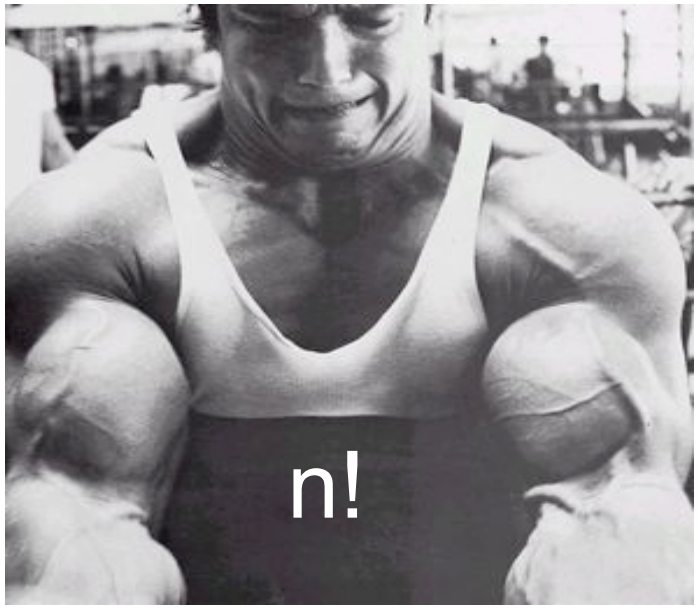
Worst-case Inputs

Efficient in terms of what?

$N = 2n^2$ for SMP

Input size N

Definition-II



Analytically better than brute force

How much better? By a factor of 2?

Definition-III

Should scale with input size

If N increases by a constant factor, so should the measure

Polynomial running time

At most $c \cdot N^d$ steps ($c>0$, $d>0$ absolute constants)

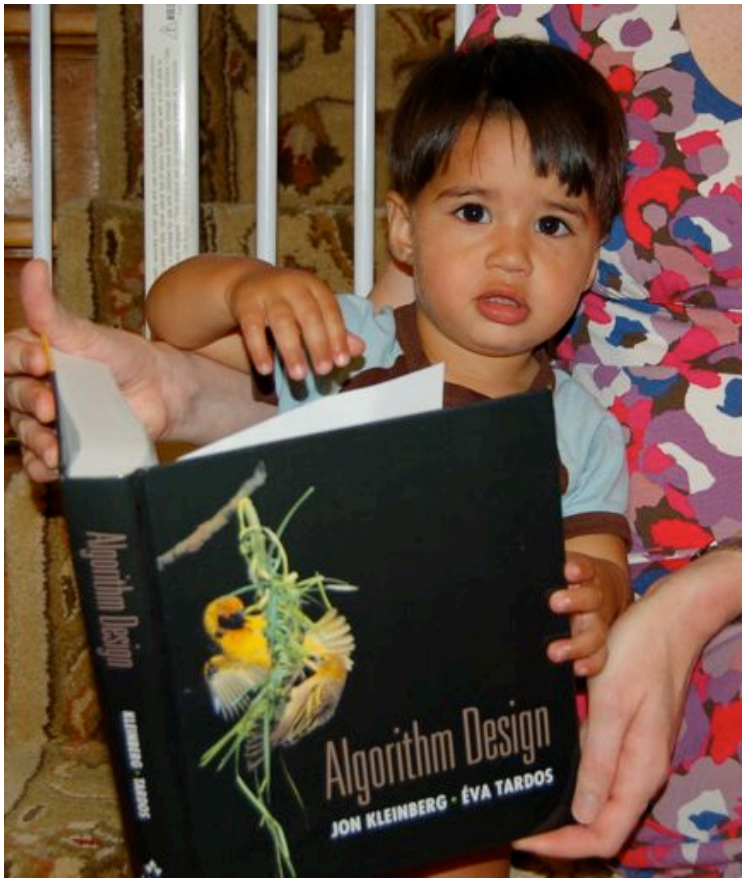
Step: “primitive computational step”

More on polynomial time

Problem centric tractability

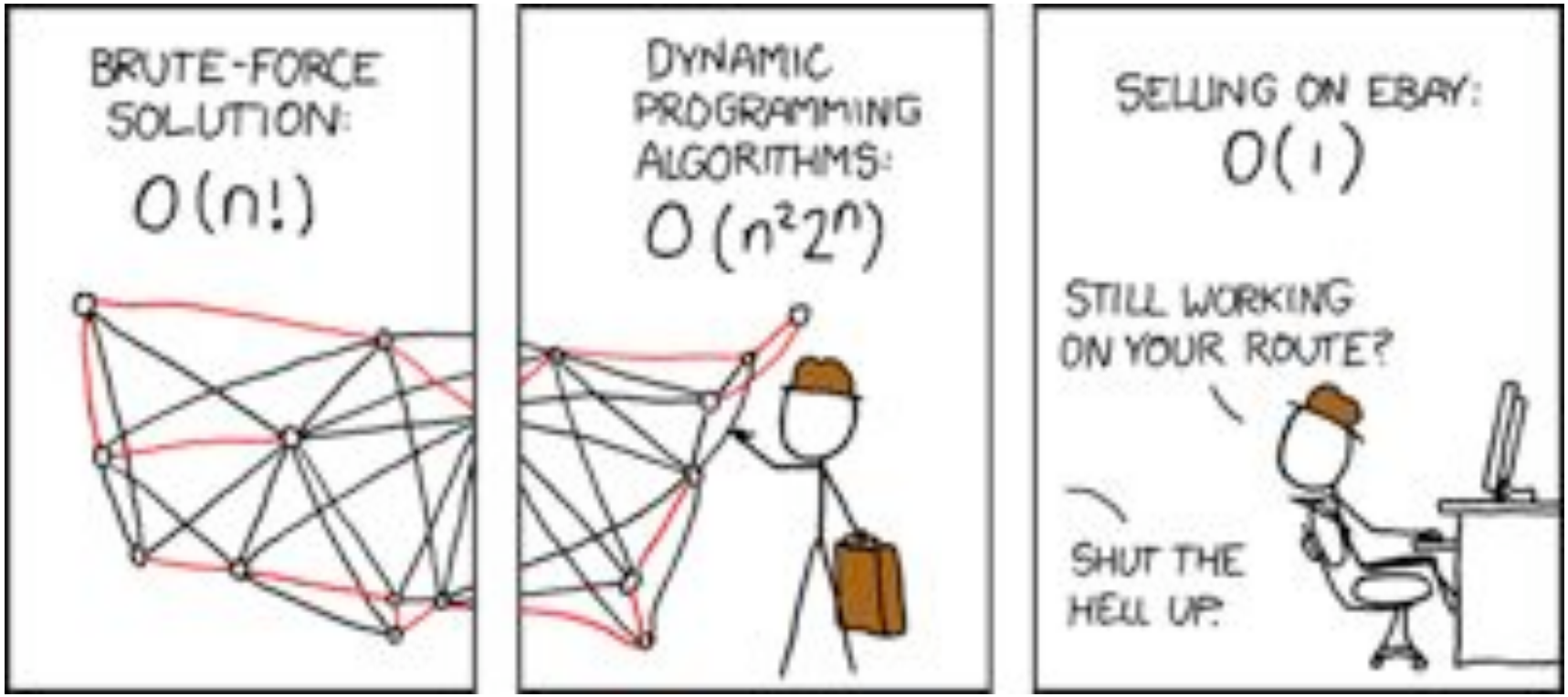
Can talk about problems that are not efficient!

Reading Assignments



Sections 1.2, 2.1, 2.2 and 2.4 in [KT]

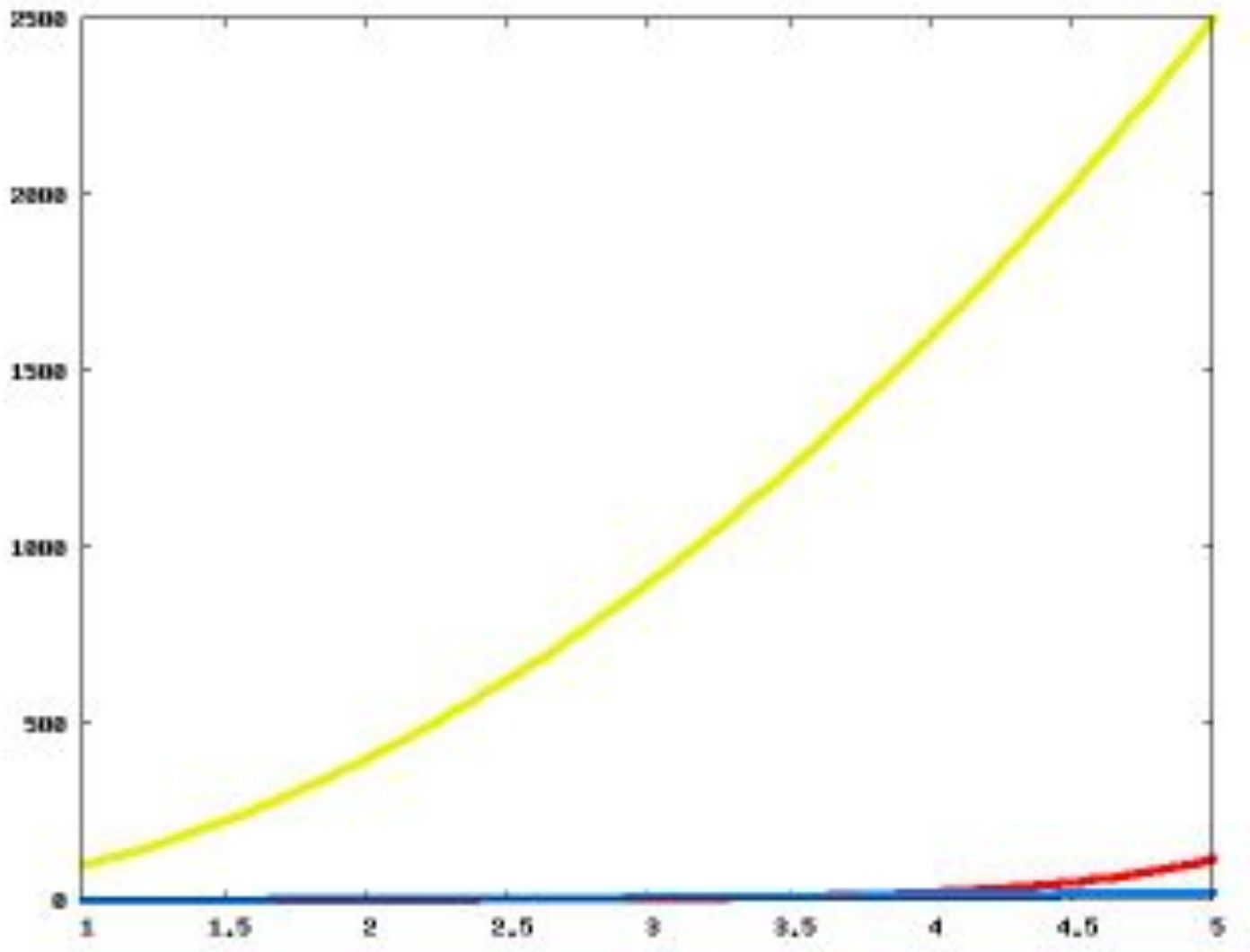
Asymptotic Analysis



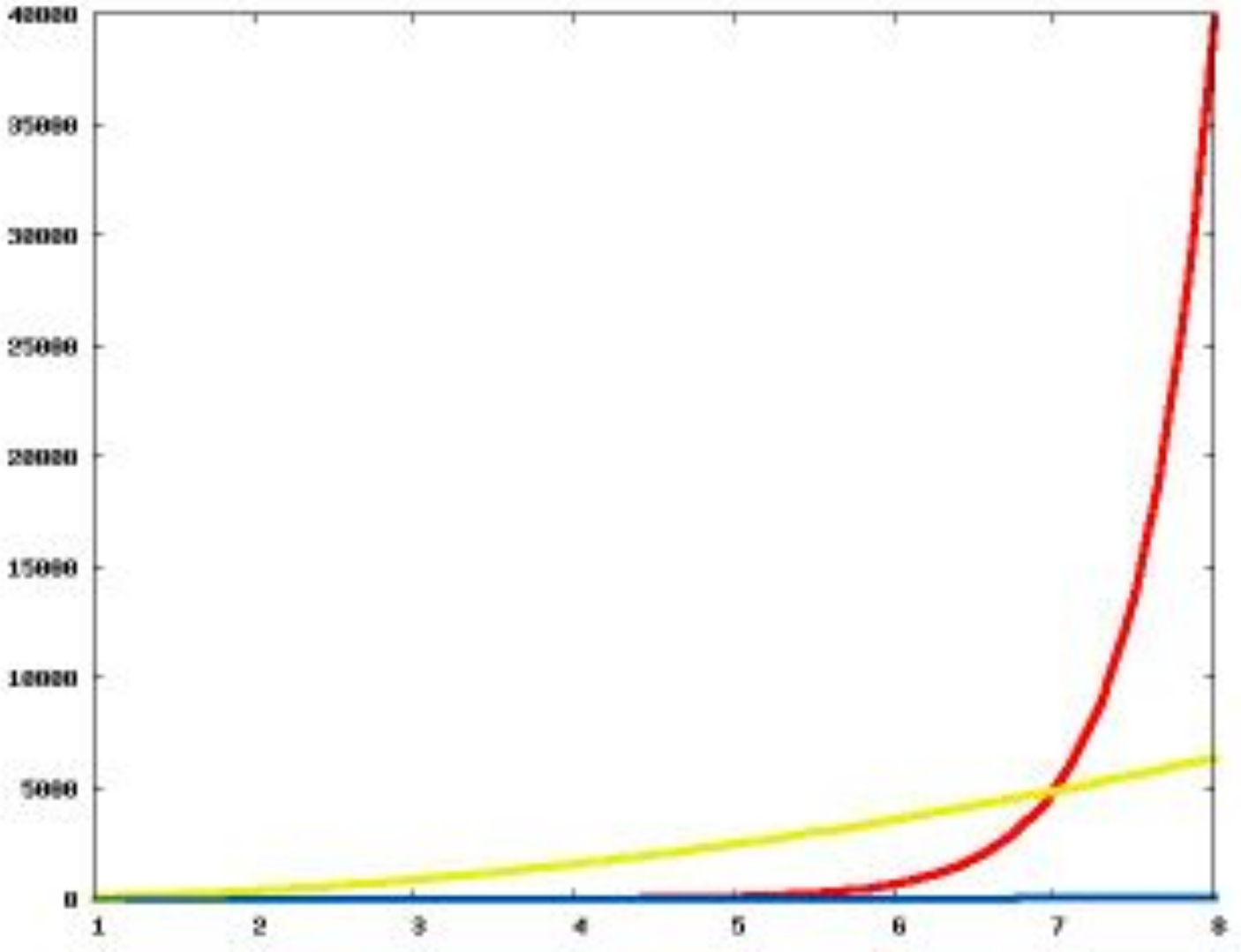
Travelling Salesman Problem

(http://xkcd.com/399/)

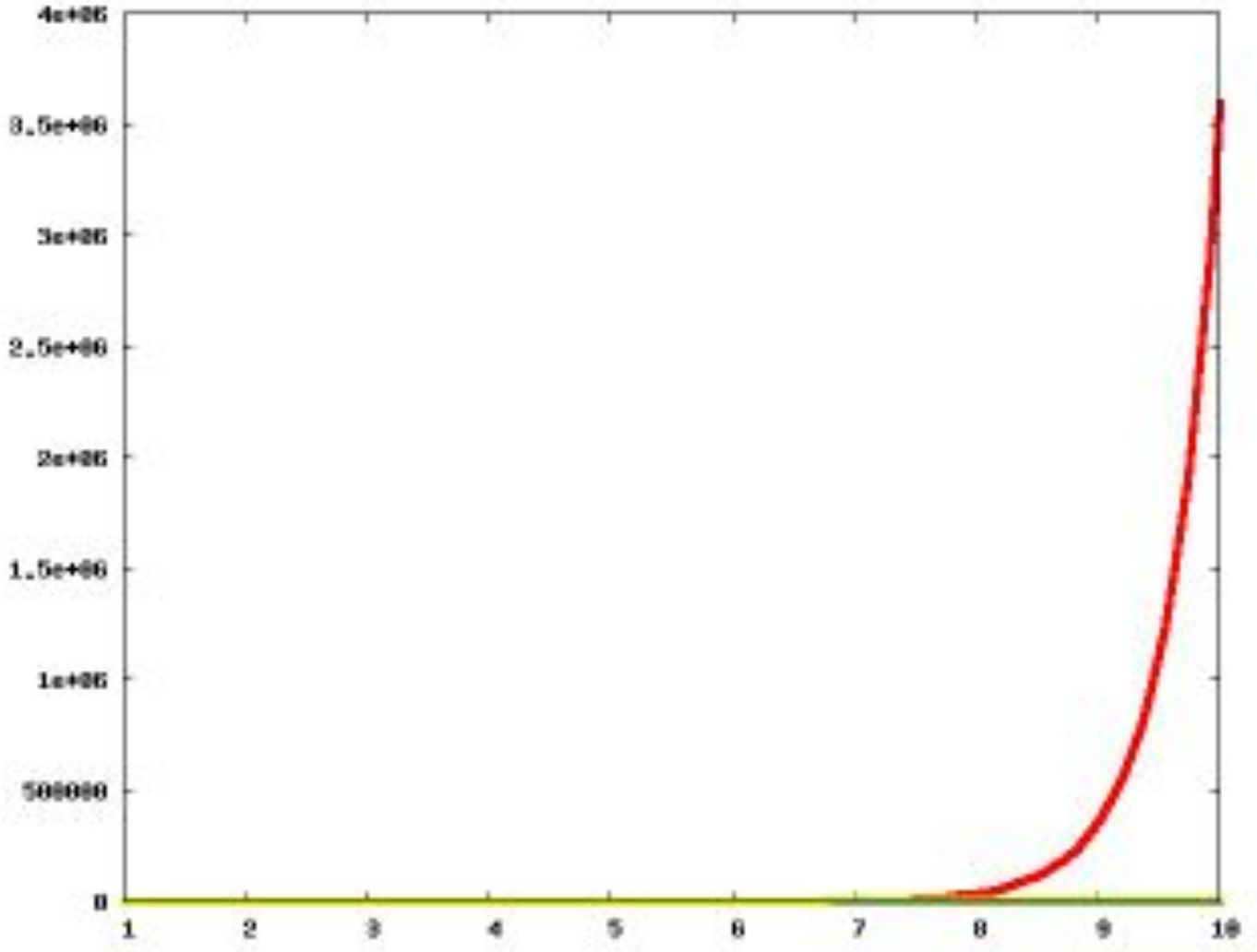
Which one is better?



Now?



And now?

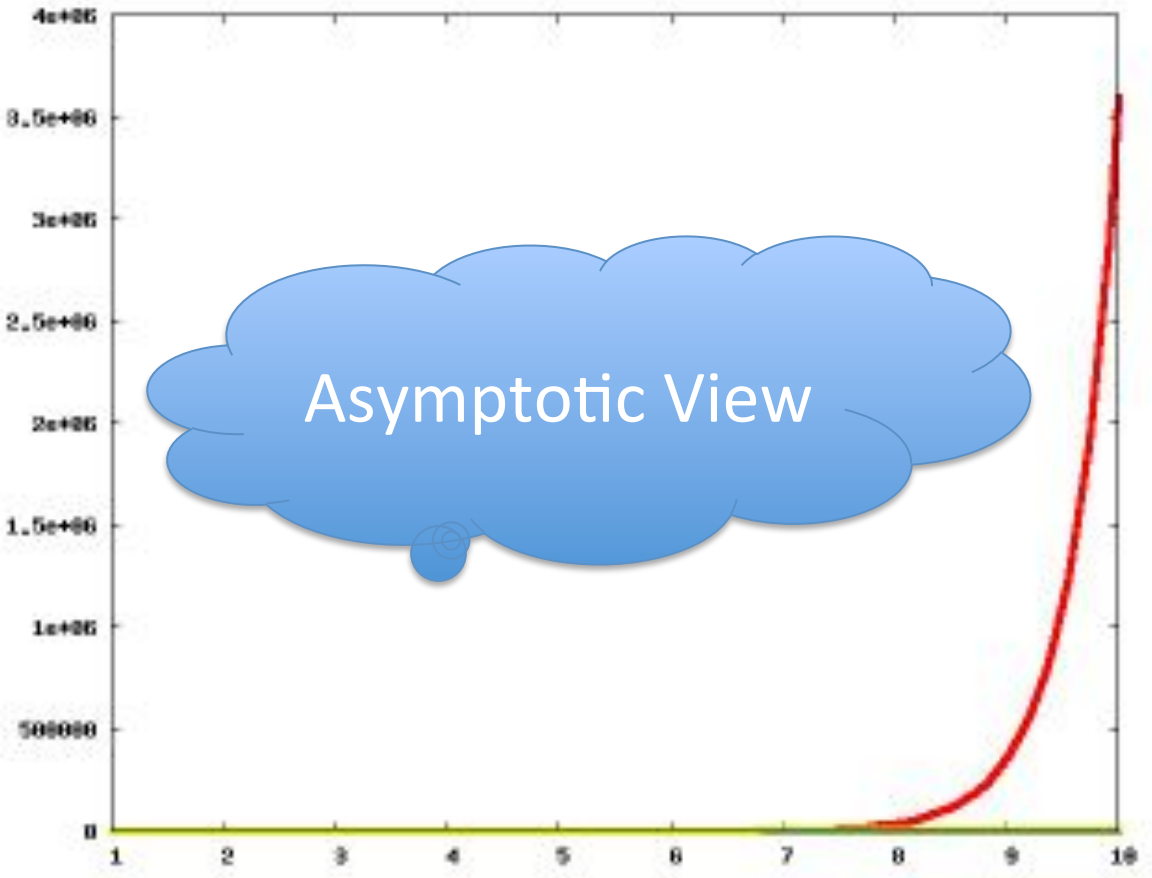


The actual run times

n!

$100n^2$

n^2



Asymptotic Notation

≤ is O with glasses

≥ is Ω with glasses

= is Θ with glasses

Another view