CSE 421

Introduction to Algorithms

(from Sandia via Mark B. de Solla Stuht)
How do you quantify "Efficiency"?

**Approach 1:** Implement, Measure 2 Extrapolate

Pros: can be very accurate

Cons:
- How good was the implementation?
- How portable are the results?
- How "typical" were the test cases?
- What's the worst case (real-time)?
- How reliable are extrapolations?
- What insight do the numbers give?

Lots of work!
Quantify Efficiency (cont.)

Approach 2: "Asymptotic analysis"
- In the limit
- How does run time (space,...)
- grow
- as a function of
- problem size,
- in worst case.

E.g.: "simple matrix multiply takes $n^3$ steps."

Cons:
- "size" may not be key parameter;
- worst case may be rare;
- "linear" may be impractically huge

Pros:
- we're often lucky & "coke" avoids!
- Easy, first-order comparisons