

6.892

Class 2

Feb. 13, 2019

## Preview of L10: (#P & ASP)

NP = { decision problems | poly-time certificates }  
= solutions

NP search problem = find a solution (if any)  
- at least as hard as decision problem

Counting version #X of NP search problem X:  
compute how many solutions

- at least as hard as decision problem (0 vs. >0)
- #X (or X) is #P-hard if #X is at least as hard as all such problems (#P)

Another Solution Problem: ASP X = given an instance & one solution, is there another?

- negation of "is this solution unique?"
- X is ASP-hard  $\Rightarrow$  ASP X is NP-hard  
 $\hookrightarrow$  formal definition is stronger & more involved

C-monious reduction from A to B if  
# solutions to B =  $C \cdot$  # solutions to A  
any efficiently computable function of instance  
- for #P-hardness

Parsimonious = 1-monious

- for #P- & ASP-hardness

## Coauthor tips:

- use message titles (for TOC)
  - delete blank messages
  - delete makes message invisible to others (except staff)
  - unpublish does the same
  - minimize makes message default-folded (only title visible, click + to expand)
  - @mentioning is local to message ~ replies / attachments need them repeated (for solved problems)
  - edit old messages to flesh out details
  - emoji responses
  - drag messages in TOC to reparent
  - list of Markdown & LaTeX features
  - Github issues
- Documentation link at bottom