

Lecture 39 (the last!)

CSE 331

May 7, 2021

WHY DON'T YOU REPLY MY EMAILS?

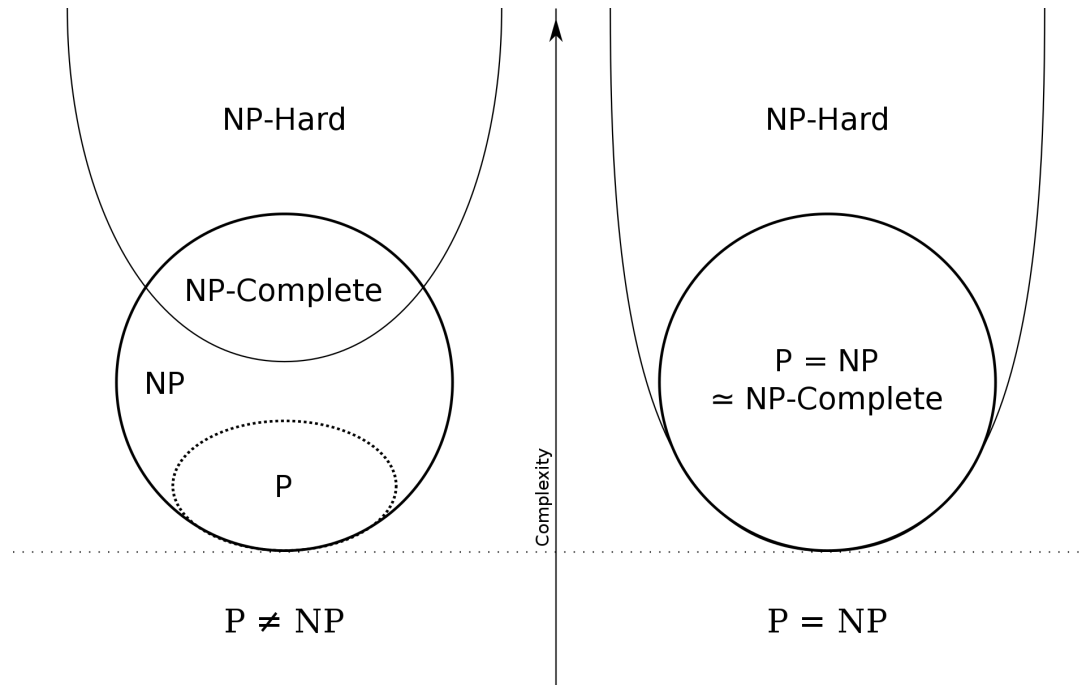
- **Anthony Morales**
- **Ian (Hunter) Rozensky**

- Seriously, why?!

Please don't cheat

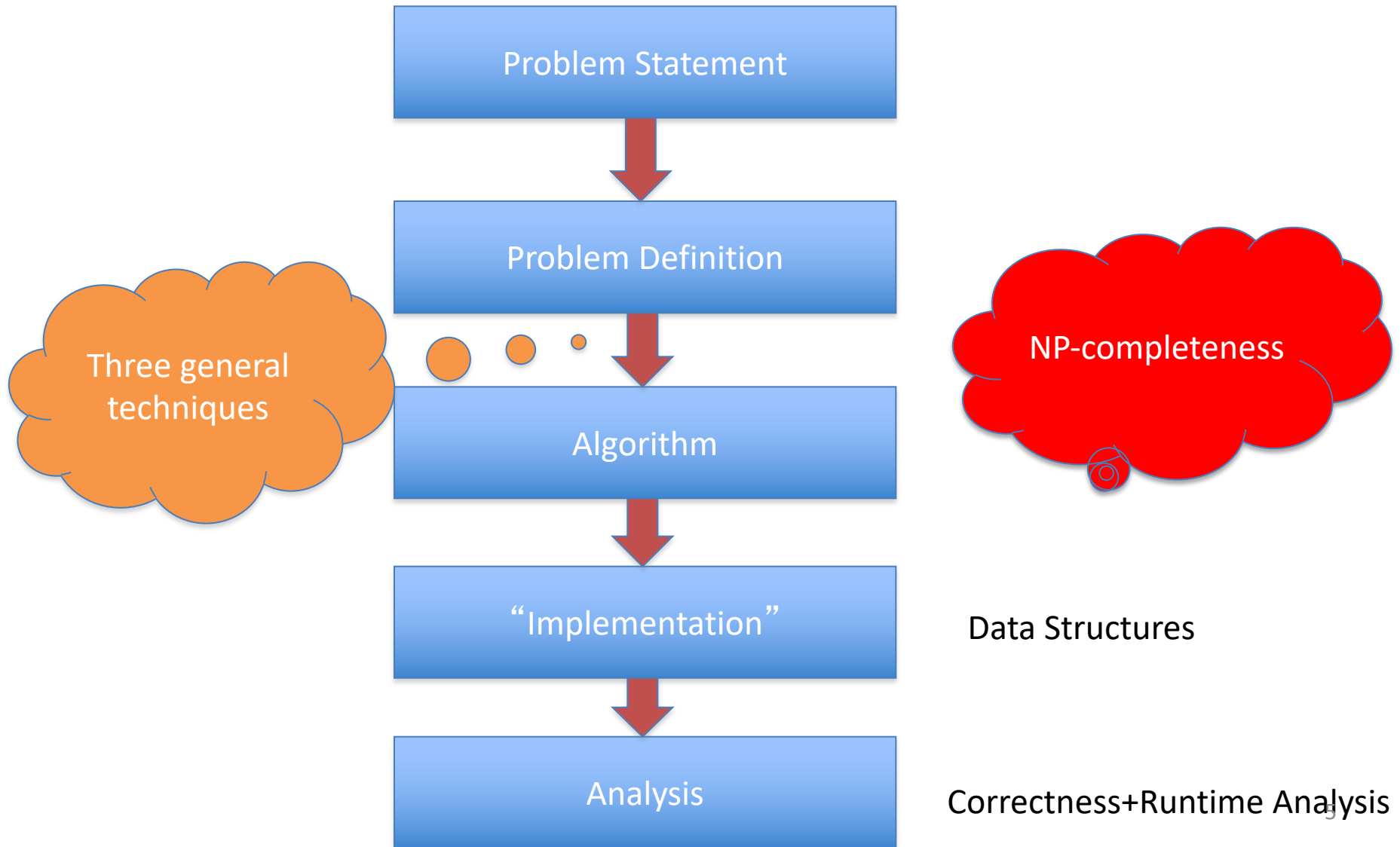
- There's an increase in Academic Integrity violations in the last few weeks.
- Remember the course policy!
 - First violation: One of the following
 1. ZERO for the entire hw AND a letter grade reduction
 2. F
 - Second violation: F

Today's agenda



Beyond NP-completeness

High level view of CSE 331



Now relax...



Randomized algorithms

What is different?

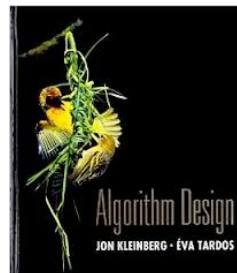
Algorithms can toss coins and make decisions

A Representative Problem

Hashing

Further Reading

Chapter 13 of the textbook



<http://calculator.mathcaptain.com/coin-toss-probability-calculator.html>

CSE 432:
Randomized
Algorithms Analysis
and Design!

Approximation algorithms

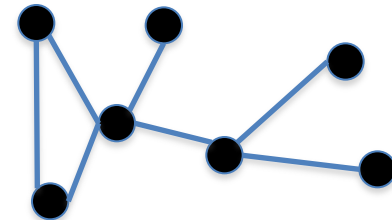
What is different?

Cool twist: NP-hardness of approximations!

Algorithms can output a solution that is say 50% as good as the optimal

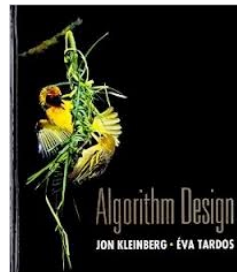
A Representative Problem

Vertex Cover



Further Reading

Chapter 12 of the textbook



Online algorithms

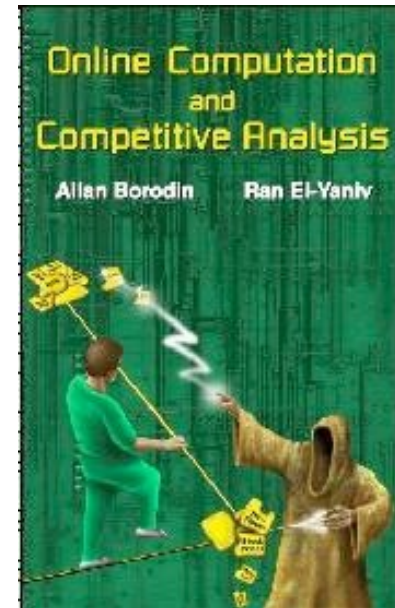
What is different?

Algorithms have to make decisions before they see all the input

A Representative Problem

Secretary Problem

Further Reading



Data streaming algorithms

What is different?



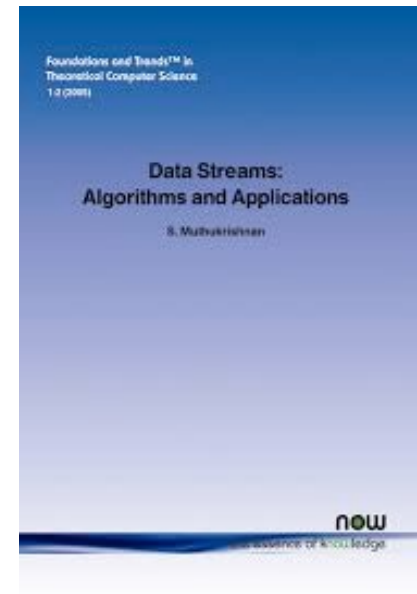
<https://www.flickr.com/photos/midom/2134991985/>

One pass on the input with severely limited memory

A Representative Problem

Compute the top-10 source IP addresses

Further Reading



Distributed algorithms

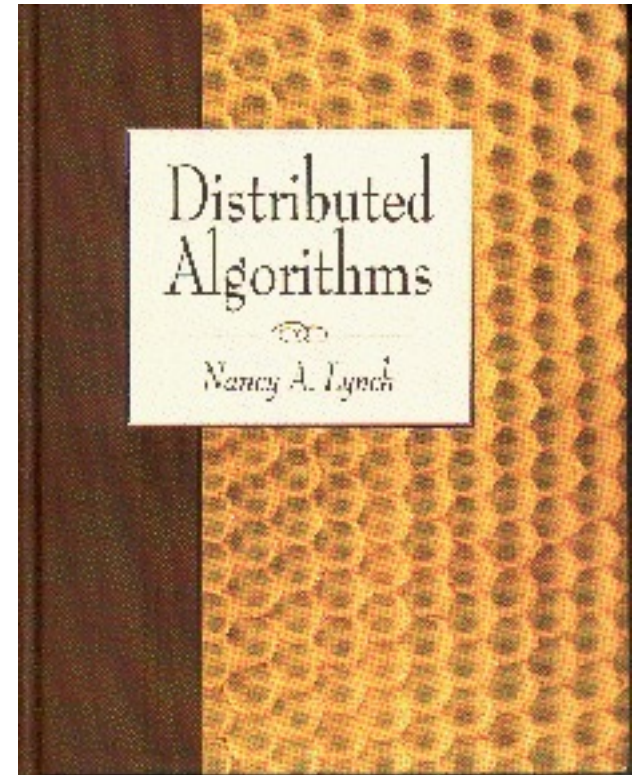
What is different?

Input is distributed over a network

A Representative Problem

Consensus

Further Reading



Beyond-worst case analysis

What is different?

Analyze algorithms in a more instance specific way

A Representative Problem

Intersect two sorted sets

Further Reading



<http://timroughgarden.org/f14/f14.html>

Algorithms for Data Science

What is different?

Algorithms for non-discrete inputs

A Representative Problem

Compute Eigenvalues

Further Reading



<https://www.cs.cornell.edu/jeh/book.pdf>

Algorithms and Society

What is different?

Measuring and correcting for harms caused by Algorithms

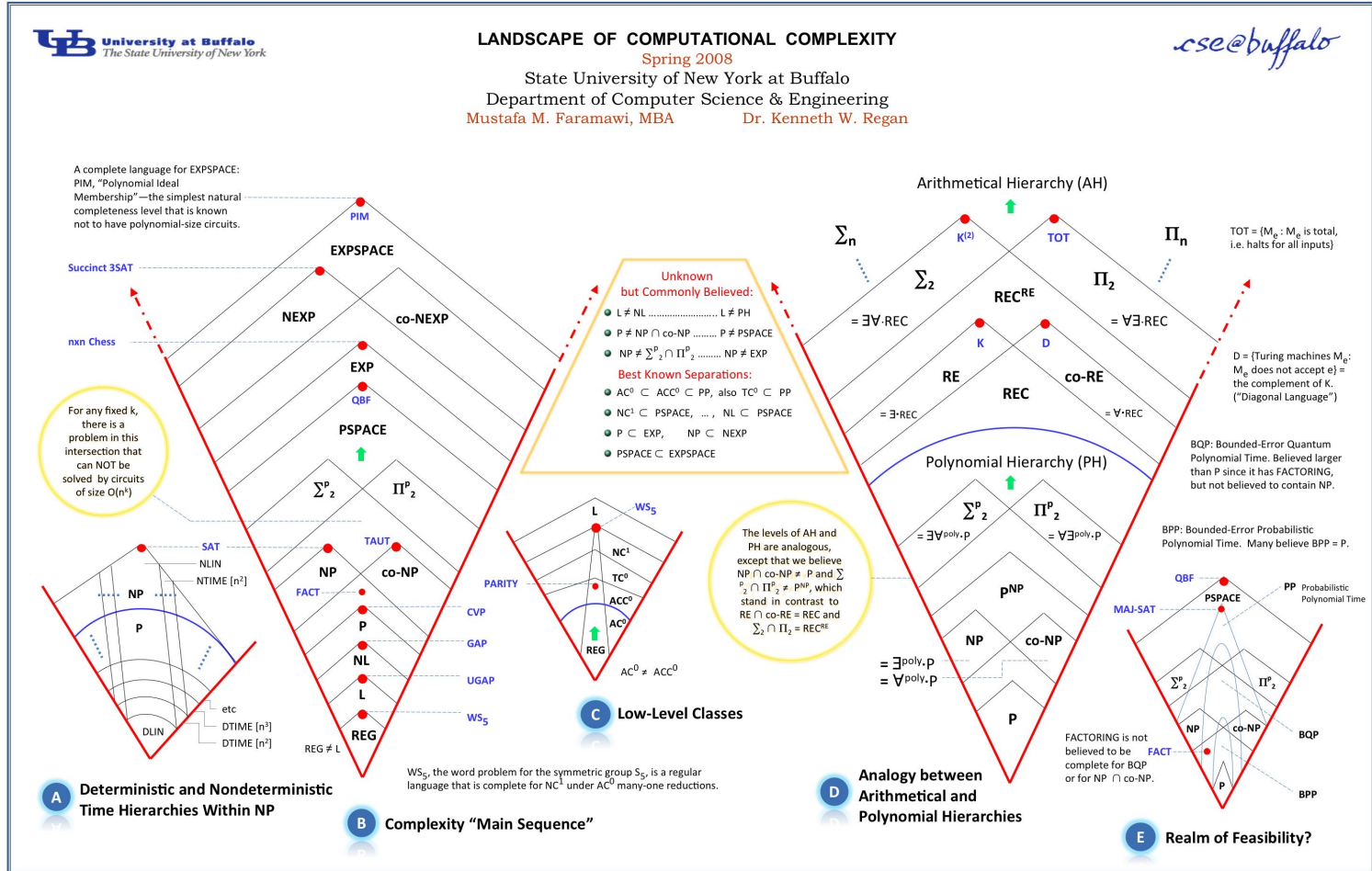
A Representative Problem

Bias in ML

Further Reading

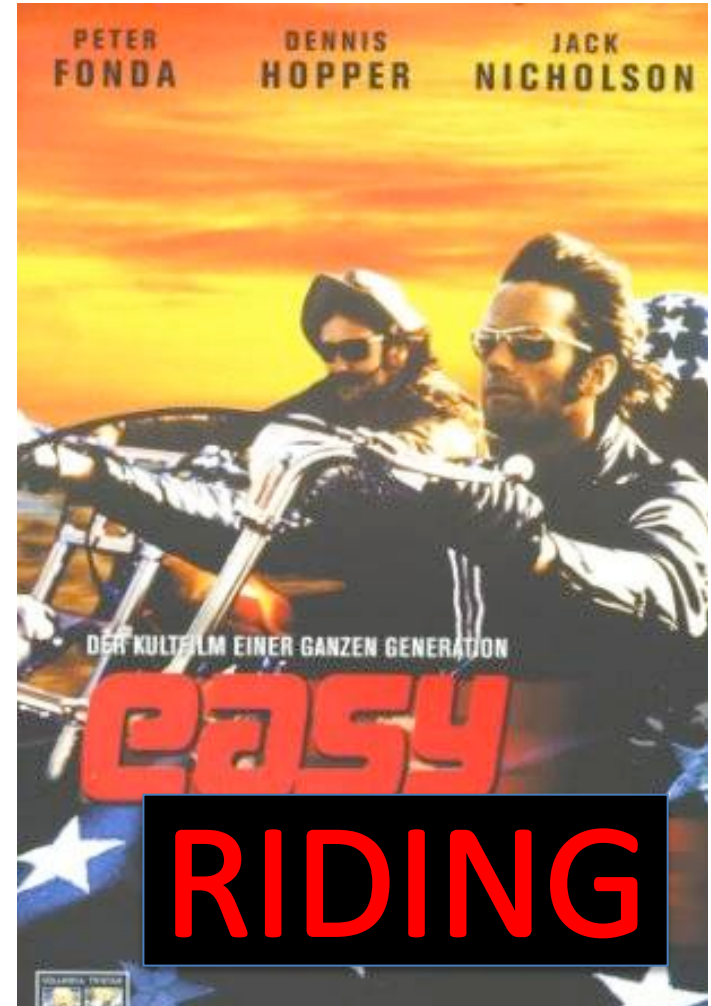
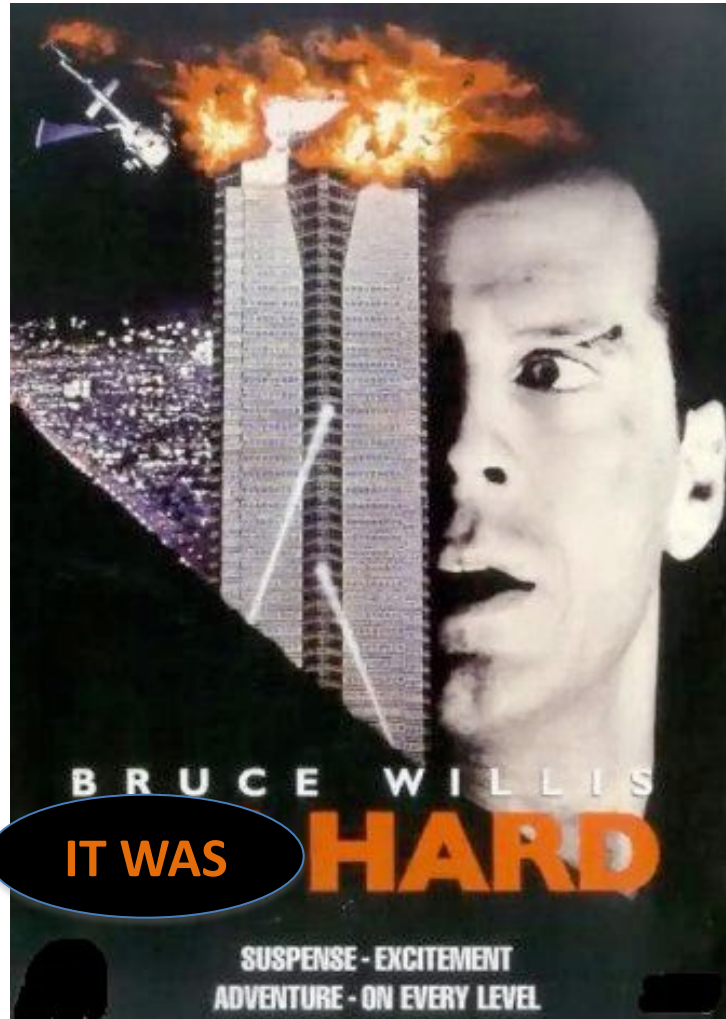
CSE 410 by Atri Rudra

Anything > NP and < undecidability?

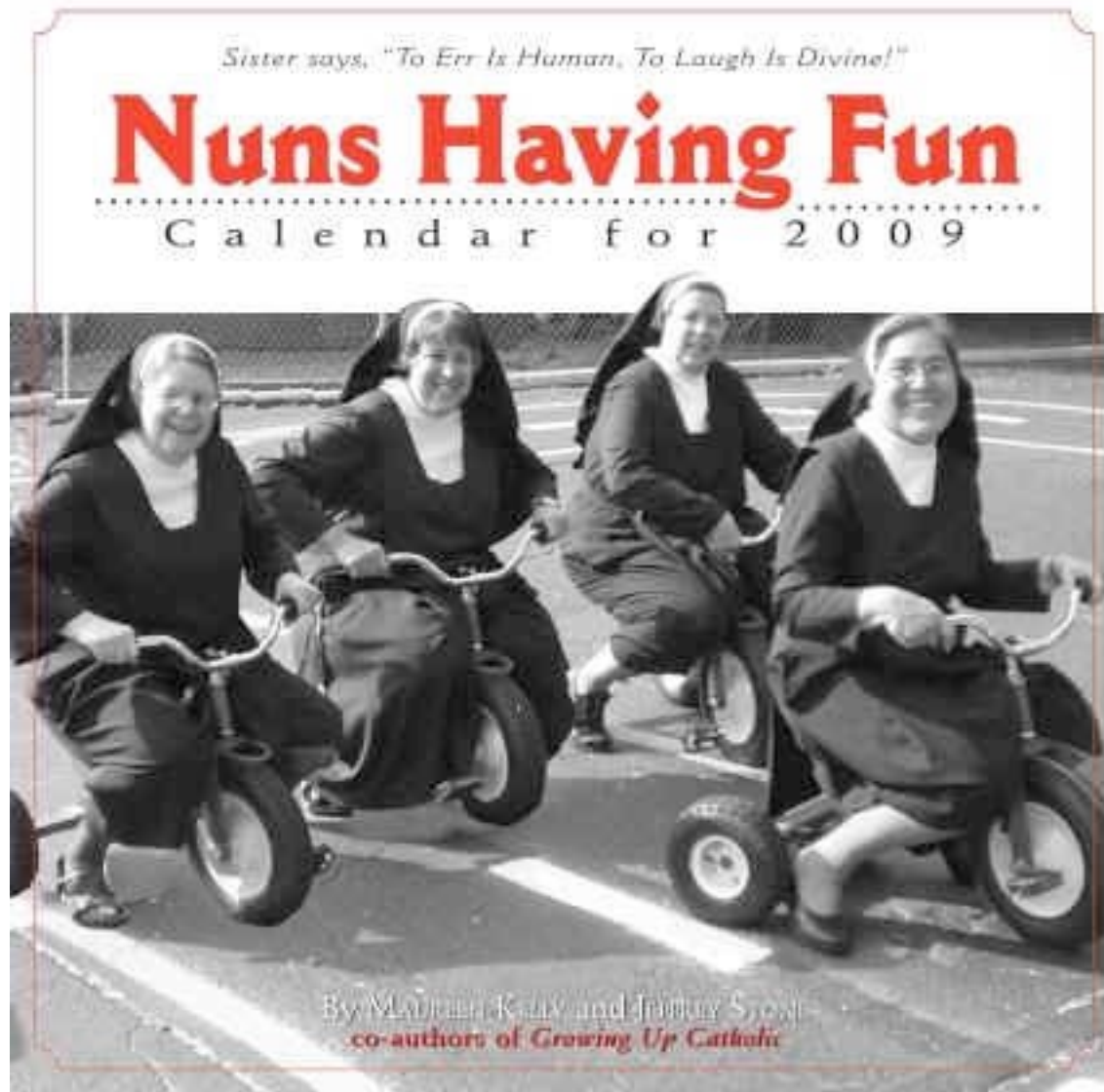


Q & A session

Whatever your impression of the 331



Hopefully it was fun!



Thanks!



Except of course the final exam