

CS 135 Discrete Structures

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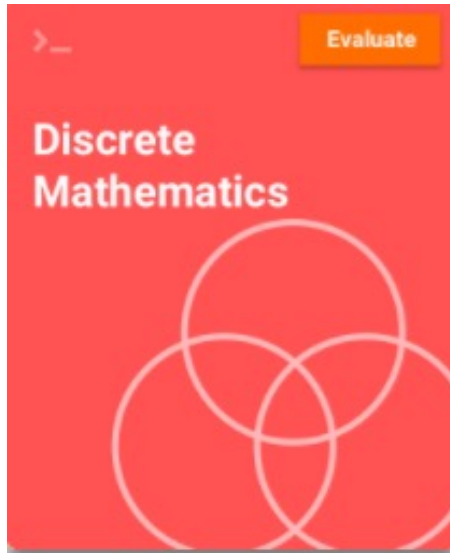
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Office hours, email addresses, lab rooms and zoom links will be maintained on Canvas Modules

Required Online Textbook



1. Go to learn.zybooks.com
2. Create your account
Use SID and name as on Canvas
3. Enter code
STEVENSCS135BhattSpring2023
4. Subscribe
Subscription is \$58
(good thru June 15, 2023)

Set up your subscription TODAY!

Assignment 1 is due next Thursday (1/26).

Additional Reading

Discrete Mathematics and its Applications, 8th edition, by Kenneth Rosen

Covers everything in this course, and much more. Contains many examples and thousands of problems to practice (with answers to half at the end of the book).

Use this to reinforce concepts and to prepare for exams.

Course Topics

Formal Logic

Sets

Functions and Relations

Induction and Recursion

Elementary recursive programming

Elementary Number Theory

Elementary Graph Theory

Logic

- a. If the government is lying, then the Mars Rover has a bug.
- b. If Rover does not find life on Mars, then Rover has a bug or there is no life on Mars.
- c. If Rover does not have a bug, then if there is life on Mars, Rover will find life on Mars.
- d. If Rover finds life on Mars and Rover has a bug, then the government is lying.

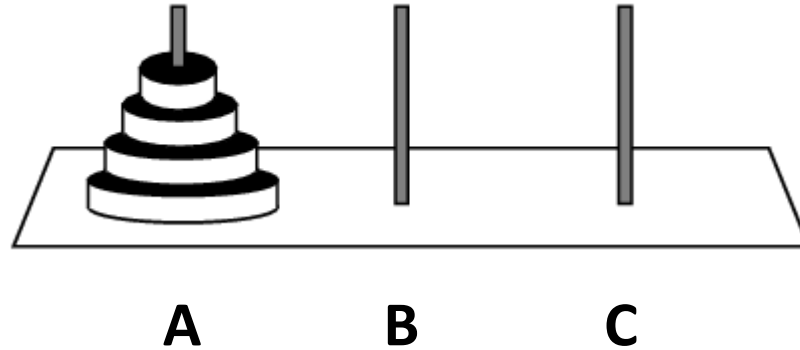
Therefore, the government is lying.

Is this argument valid?

What makes an argument valid anyway?

How can we distinguish between valid and invalid arguments?

Induction: The Towers of Hanoi



Goal: Move the tower from peg A to peg C.

Move one disk at a time.

Never place a larger disk atop a smaller one.

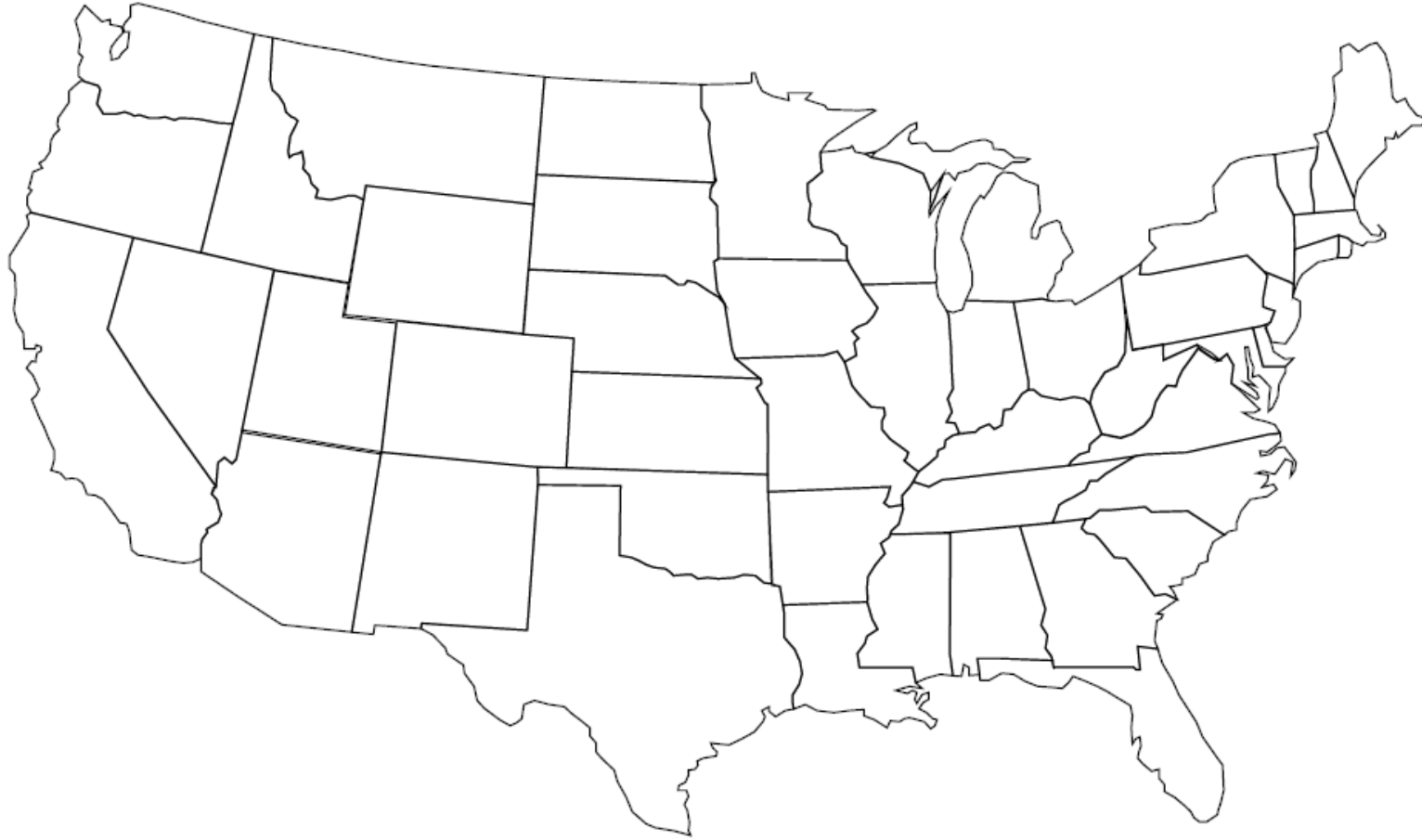
Questions: Is there always a solution?

How many moves are needed for a tower of n disks?

Is there a concise program for this problem?

How do I prove that the program correctly solves the problem?

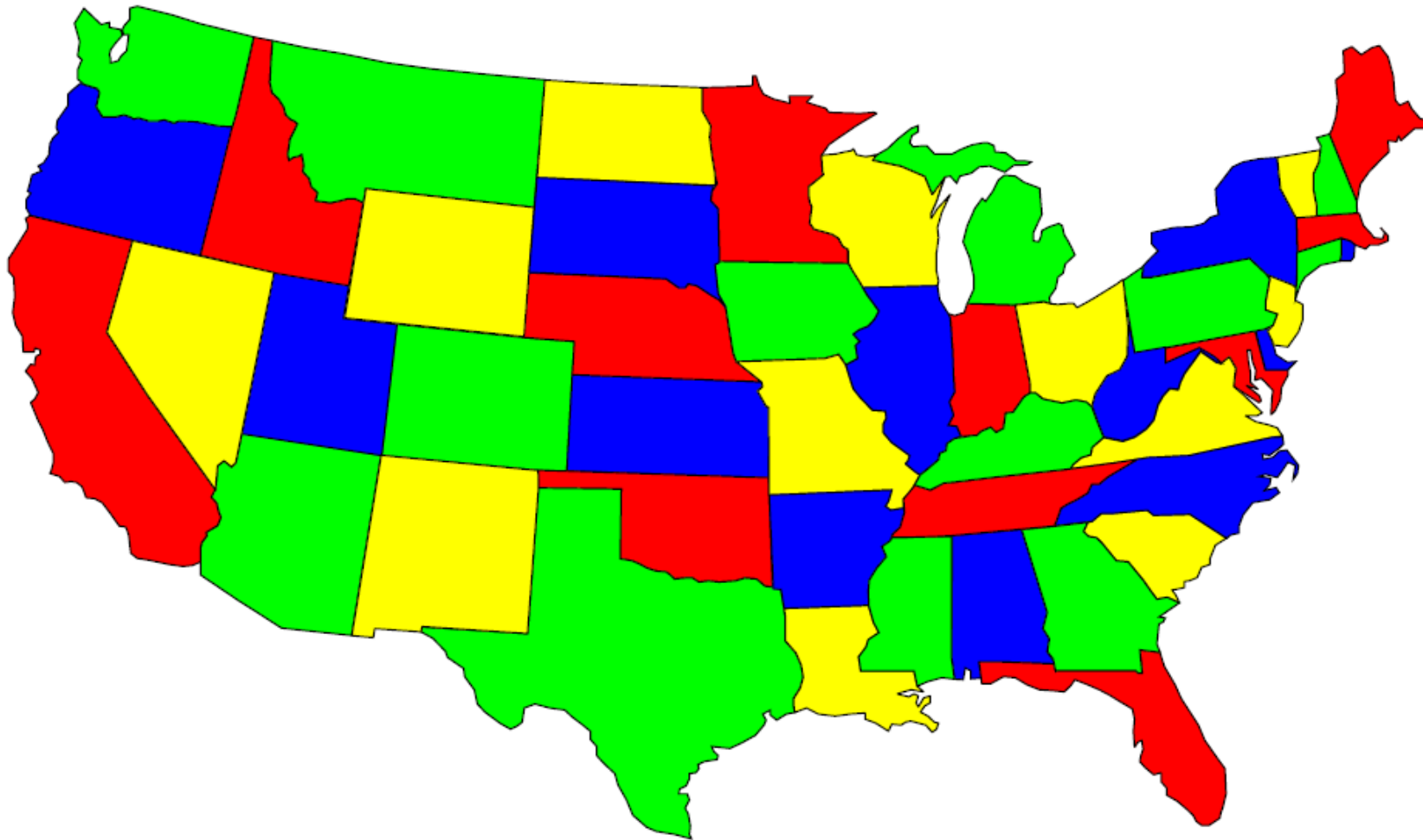
Graph Theory: Map Coloring



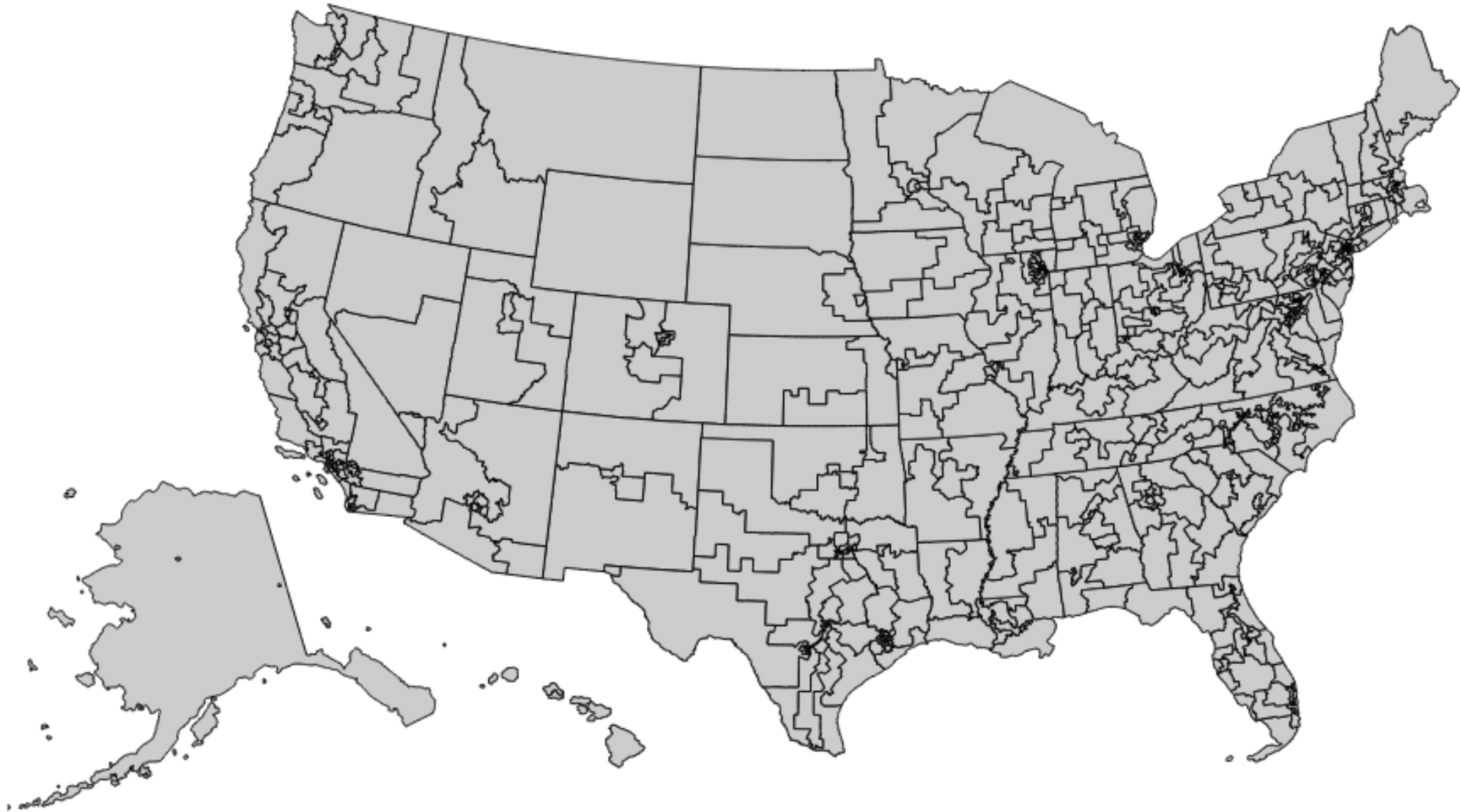
Any two states that share a border must be colored differently.

How many colors suffice?

4 colors are sufficient



Map of US congressional districts



Number Theory: Securing Communication Channels



Evil Eve is eavesdropping on the communication

Eve can read every bit transmitted between Alice and Bob

Eve can send a message that Bob will think it came from Alice (spoofing)

Eve can intercept and alter messages between Alice and Bob (man-in-the-middle)

How can Alice and Bob communicate securely even when Eve can read every bit transmitted?

What you will leave with

How to think and reason logically

How to recognize bogus arguments

How to write (precise and concise) proofs

How to think recursively

How to write recursive programs that scale

How to prove properties of recursive programs

How to solve problems (logical, numerical, relational)

Secrets to success in 135

Keep an open mind.

Be curious, inquisitive, and enjoy the material.

Do not chase points. Allow yourself to make mistakes and learn from them.

Seek help from me and the CAs. We want you to succeed!

Start thinking about homework problems early in the week.

Course Work and Grading

10%	Online Assignments
20%	Problem Sets (weekly)
20%	Labs
15%	Mid-Term Exam
30%	Final Exam
5%	Participation

Final letter grades will be curved

Any grade dispute must be brought to our attention within one week of the grade being issued.

Participation Matters!

Be actively engaged

In class and labs: ask and answer questions

Office Hours: Show up for help

We will help you if you are stuck on a problem

Working on problem sets

You may either work alone or in pairs

Find a partner this week

We will help find you a partner if you cannot

Every student must submit their work

Think through a problem together before seeking help from CAs or me

Do NOT ask us to check your answers before submitting your work

Class Etiquette

Abide by the Stevens Honor Code.

Show up to your assigned lab

work on your own, ask CAs for help, submit your work during lab

No makeup exams without my prior approval

Online Reading Assignments

Reading Assignments must be completed prior to each lecture.

Due dates and times will be visible in the online text and will NOT be posted on Canvas.

The first online assignment will be visible when you obtain access to the online textbook.

Assignment 1 is due before next Thursday's lecture.

Upcoming online assignments will be posted **ONLY** in zybooks.

Zybooks late policy: No credit for work done after the deadline

Weekly Problem Sets

Submissions:

- Scan and submit pdf file of your handwritten. Typed submissions are preferred.
- Your work must be neat and legible
- After submitting your pdf file, check that it uploaded correctly

Late Policy: 20% penalty per hour (or part) your submission is late.

No exceptions without my prior approval.

What is a “proof?”

Simply put, a proof is a method of establishing the truth.

What is truth and how is it established?

Different notions of truth:

- Justice system: legal truth
- Business world: authoritative truth
- Science: empirical truth
- Statistics: probable truth
- Philosophy: careful exposition and persuasion
- Mathematics: precise notion of truth, established by a chain of logical deductions starting from a base set of axioms and concluding with the proposition under question.

Propositions

Definition: A proposition is a declarative statement that is either True or False (but not both).

- $4 + 3 = 7$
 - $1 + 1 = 3$
 - Give me an A!
 - $X + 1 = 2$
 - Humans are mortal.
 - This proposition is true.
 - This proposition is false.
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- We will use letters to denote propositions:
 - H : Humans are mortal
 - A : I want to get an A in CS135.