CIS 675
Design and Analysis of Algorithms

Dr. Asif Salekin

CIS 675: Course Personnel

- Instructor: **Dr. Asif Salekin**
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  - Office hours: Wednesdays, 1 PM-2 PM

- **Teaching Assistants:**
  - **Reyhaneh Abdolazimi**
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    - Office hours: Friday 9 AM to 11 AM.
    - Office: CST 0-123 (basement)
  - **Xinyi Zhou**
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    - Office hours: Thursday: 3:50 PM – 4:50 PM, Tuesday 12:30 PM-1:30PM.
    - Office: CST 0-124 (basement)

CIS 675: Course Topics

- Basic: Analyzing running time:
  - Asymptotic Notations: Big-O analysis
- Designing & Analyzing Algorithms
  - Recurrence relations
  - Divide & conquer
  - Greedy algorithms
  - Dynamic programming
  - Linear programming
- Complexity classes
  - P vs. NP
  - Reductions & NP-completeness

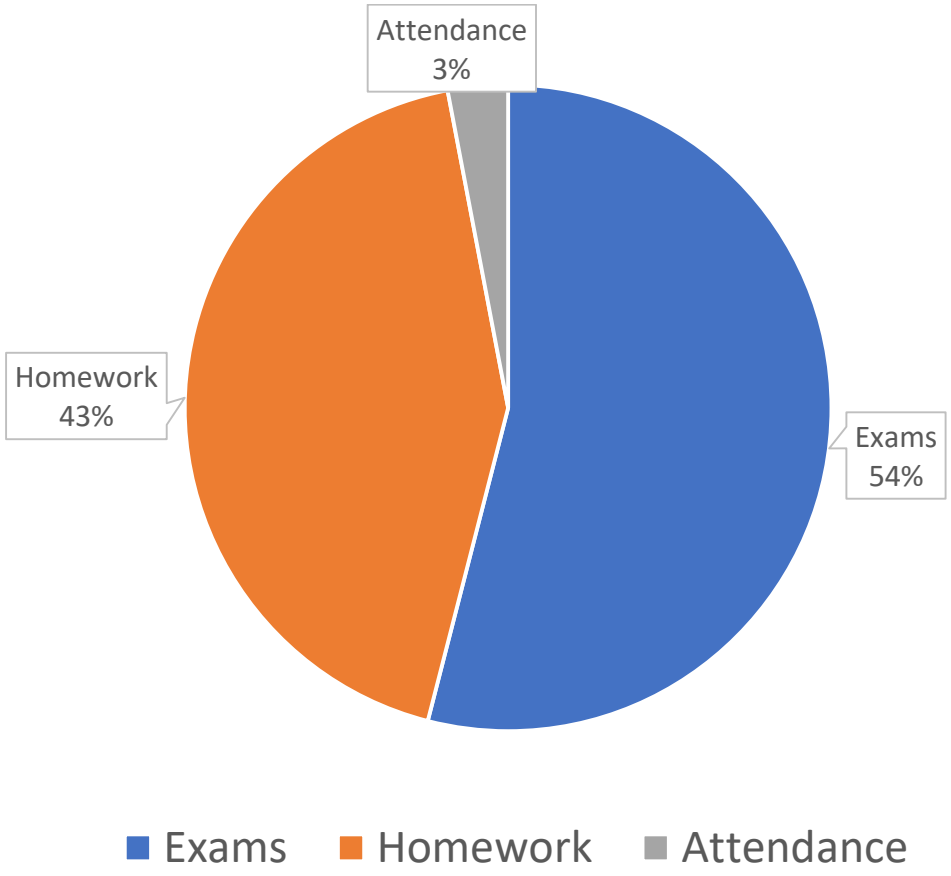
Critical thinking: Solve a problem in an efficient way

Proofs: Convince through reason

CIS 675: Blackboard

- Class lectures, assignments, evaluations, announcements, information, etc. will be distributed through Blackboard.
- Homework must be submitted through Blackboard.

CIS 675: Evaluation



CIS 675: Homework

- There will be 6 homework assignments during the semester
- ***I will drop the lowest scoring assignment!***
- Each homework will typically contain 3-5 problems.

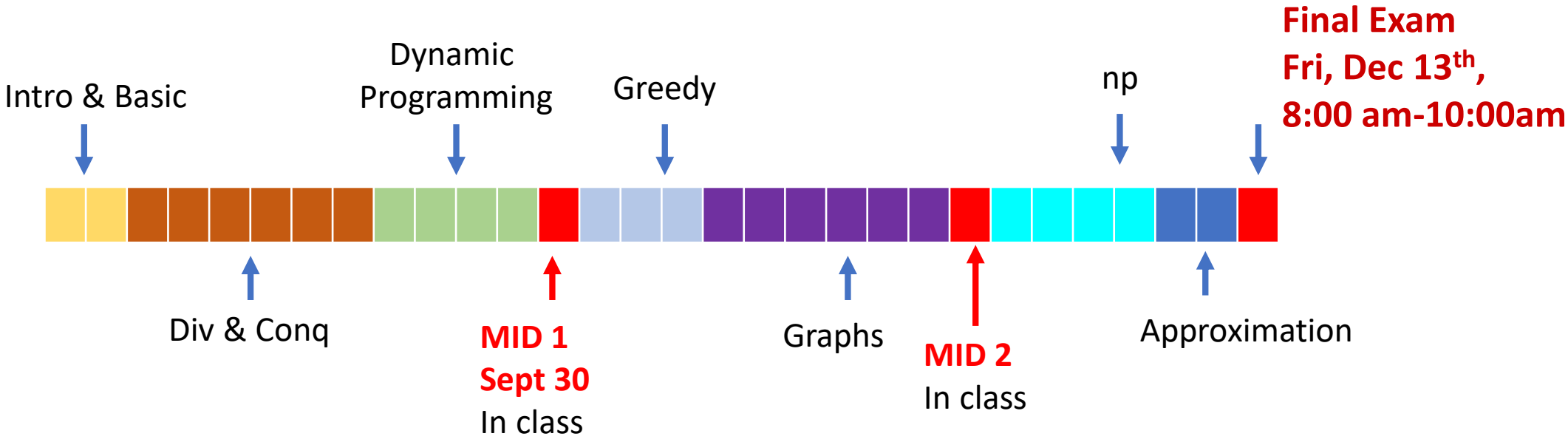
CIS 675: Homework

- Homeworks must be submitted through Blackboard as pdf files
- You may not embed images of text or formulas!
- Typically homeworks will be due on **Friday, 11:59 PM Eastern time**.
- I suggest that you use LaTeX to write your solutions!
- Latex Tutorials:
  - https://tobi.oetiker.ch/lshort/lshort.pdf
  - http://www.tug.org/twg/mactex/tutorials/ltxprimer-1.0.pdf
- TexShop tex editor for the Mac platform
- ShareLatex a web-based latex system

CIS 675: Homework

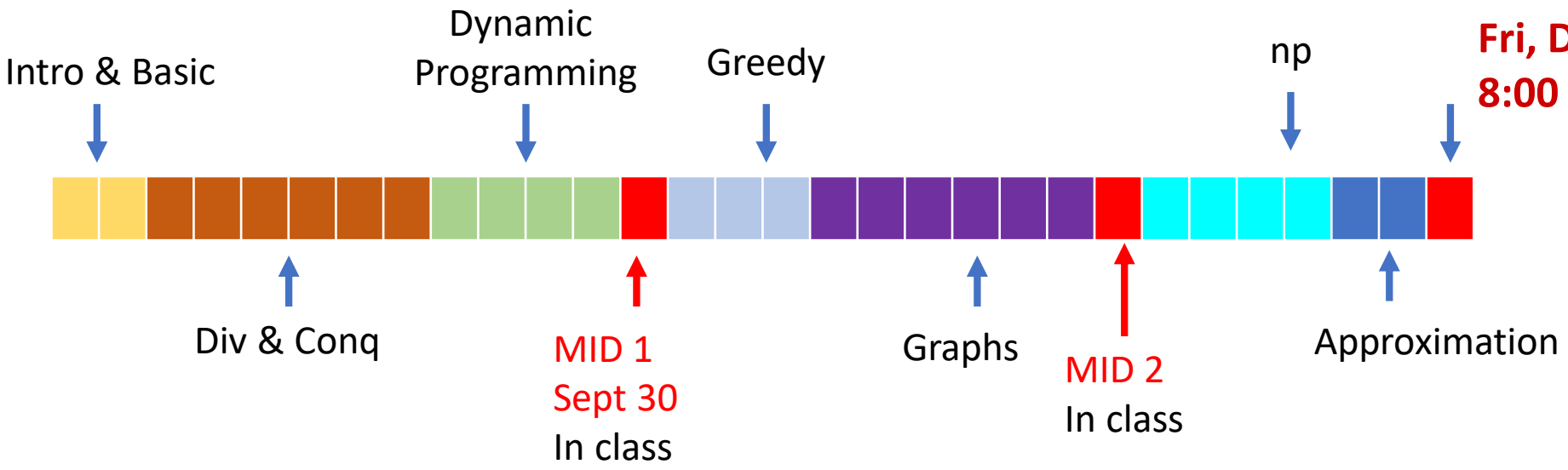
- Collaboration and use of outside sources on homework is encouraged!
- You can collaborate with at-most 3 other students.
- Mention the NetIDs of the collaborators at the top of submitted assignment.
- If you take help from an outside source, mention the source as reference.
- **But you must write up your own answers!**
- If you copy answers from another student, the internet, etc., this is an academic integrity violation!

CIS 675: Exams (54%)



- ***All exams will be closed-book, closed-note, closed-neighbor! No collaboration!***

CIS 675: Exams (54%)

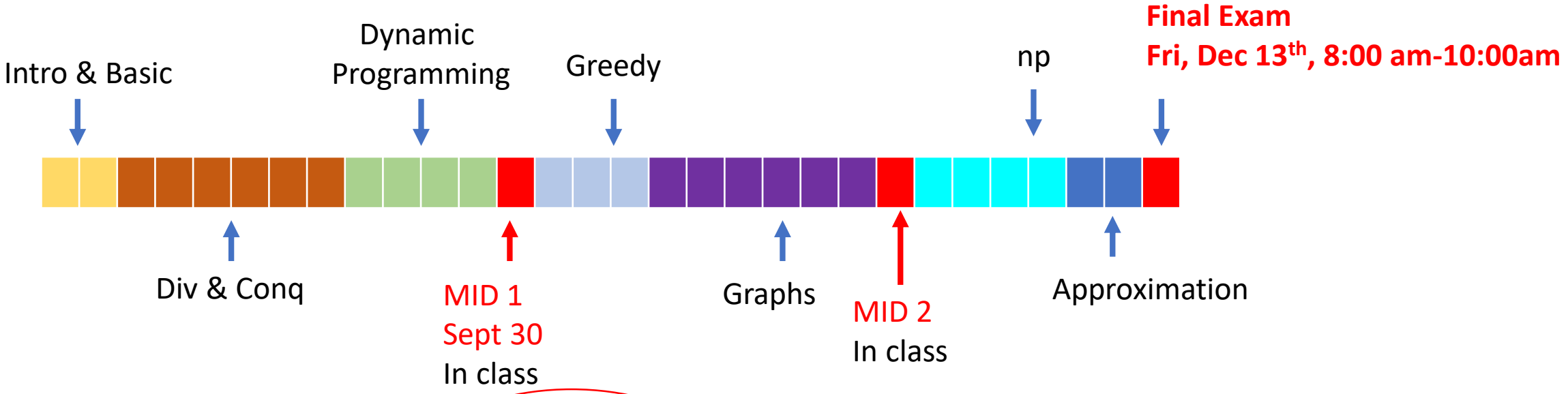


MID 1	MID 2	Final
Intro & Basic Div & Conq Dynamic Programming	Greedy Graphs	3 parts: A. MID 1 topics B. MID 2 topics C. Topics after MID 2

Max

MID 1 Topics Grade

CIS 675: Exams (54%)



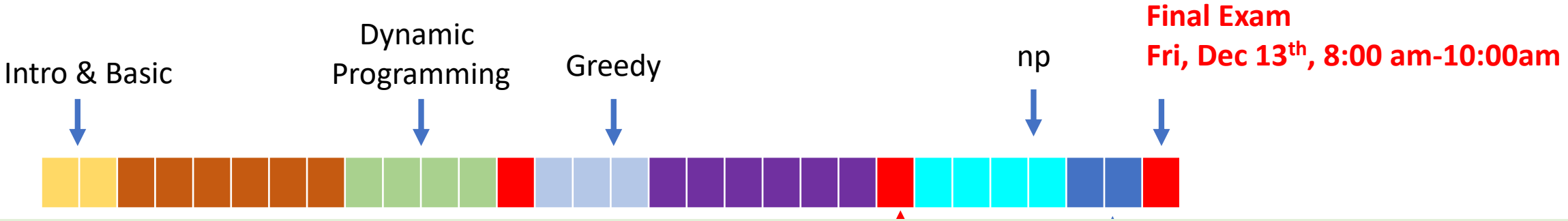
MID 1	MID 2	Final
Intro & Basic Div & Conq Dynamic Programming	Greedy Graphs	2 parts: A. MID 1 topics B. MID 2 topics C. Topics after MID 2

Max

MID 1 Topics Grade

MID 2 Topics Grade

CIS 675: Exams (54%)



So, can you miss a exam?

- Only at the discretion of the instructor. And talk with the instructor before you decide not to take a mid-term exam.

What will happen if you miss a exam, you do not have any documented emergency, and instructor did not give you consent?

- You will get 0 in the respective mid-term, and grade from the respective part of the final will be penalized.

MID 1	MID 2	Final
Intro & Basic Div & Conq Dynamic Programming	Greedy Graphs	3 parts: A. MID 1 topics B. MID 2 topics C. Topics after MID 2

MID 1 Topics Grade

MID 2 Topics Grade

Rest of the topics Grade

Total Grade

CIS 675: Make-up Policy

- If you have a documented emergency, let me know as soon as practical!
- Without documentation, no make-ups
- With documentation, make-ups at the discretion of the instructor

CIS 675: Make-up Policy

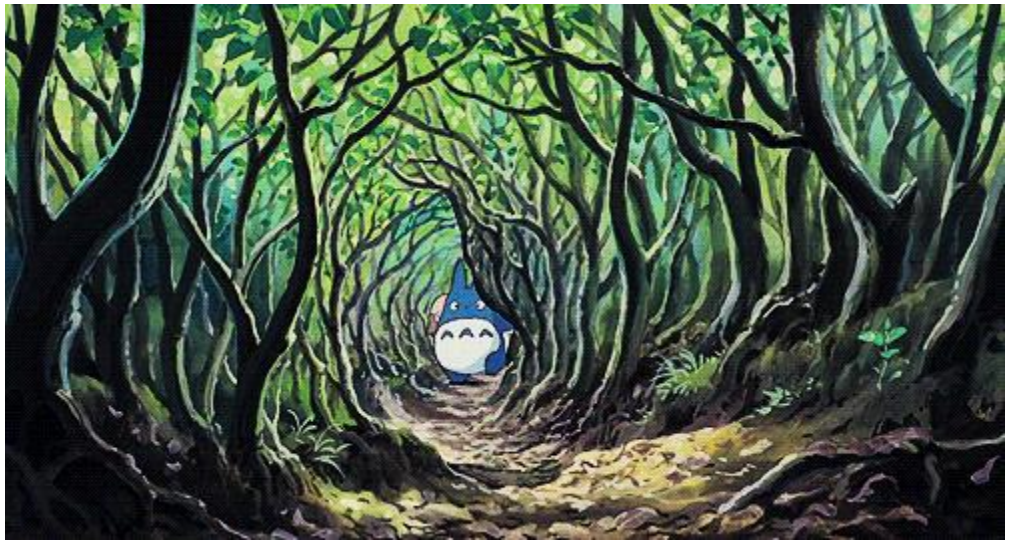
- But even if you miss homeworks or exams, that is ok!
- I drop the lowest homework score.
- You can replace your grade on an exam by doing better on the corresponding part of the final exam.

CIS 675: Late submission policy

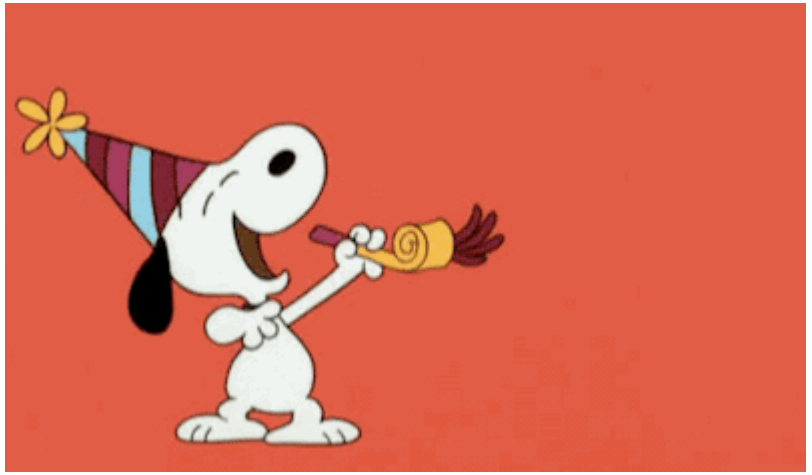
- You will get **10% × ⌈delay hours⌉** penalty for late submissions.
- Example?
  - 3 hour 2 min delay ⟹ 40% penalty.
  - 1 hour 1 min delay ⟹ 20% penalty.
- 0 hour 1 min will be considered as 1 hour!

CIS 675: Extra Credit

- Your way to get good grade!



- I will release extra credit questions throughout the semester.
- First extra credit assignment is already released!!



CIS 675: Extra Credit

- Due by Friday, August 30th, 11:59 PM (EST).
- Latex assignment! Submit both pdf and tex file.
- Tell me about yourself!
  - Mathematical background?
  - Any algorithms course before?
  - What degree program are you in?
  - What do you hope to learn from this course?
  - Anything else I should know?
- See Blackboard for full assignment!
- **Writing the homeworks in Latex will be counted as extra credit.**

CIS 675: Professionalism

- Be respectful to the instructor, TA, and other students!
- When sending an e-mail, include the course name in the subject and a clear summary of what your e-mail is about
  - “Homework 3 for CIS 675”

CIS 675: Academic Integrity

- Syracuse University takes academic integrity very seriously!
- As graduate students, if you commit an academic integrity violation, you can be suspended from the university (even if it's your first violation!)
- ***Read the academic policy carefully!***
  http://supolicies.syr.edu/ethics/acad_integrity.htm

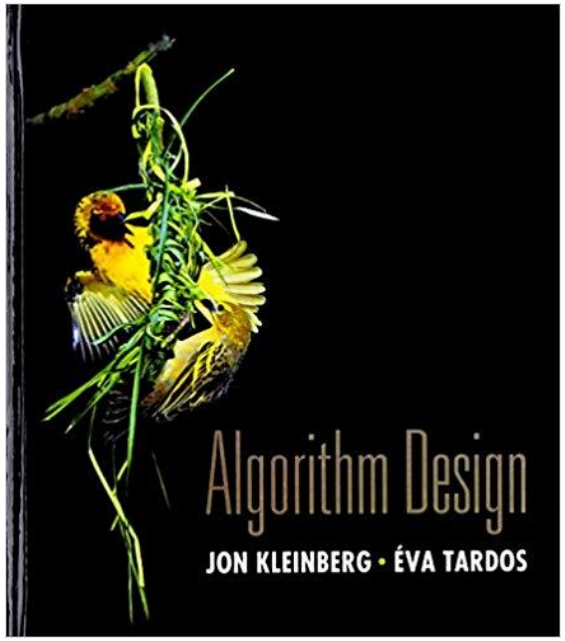
CIS 675: Academic Integrity

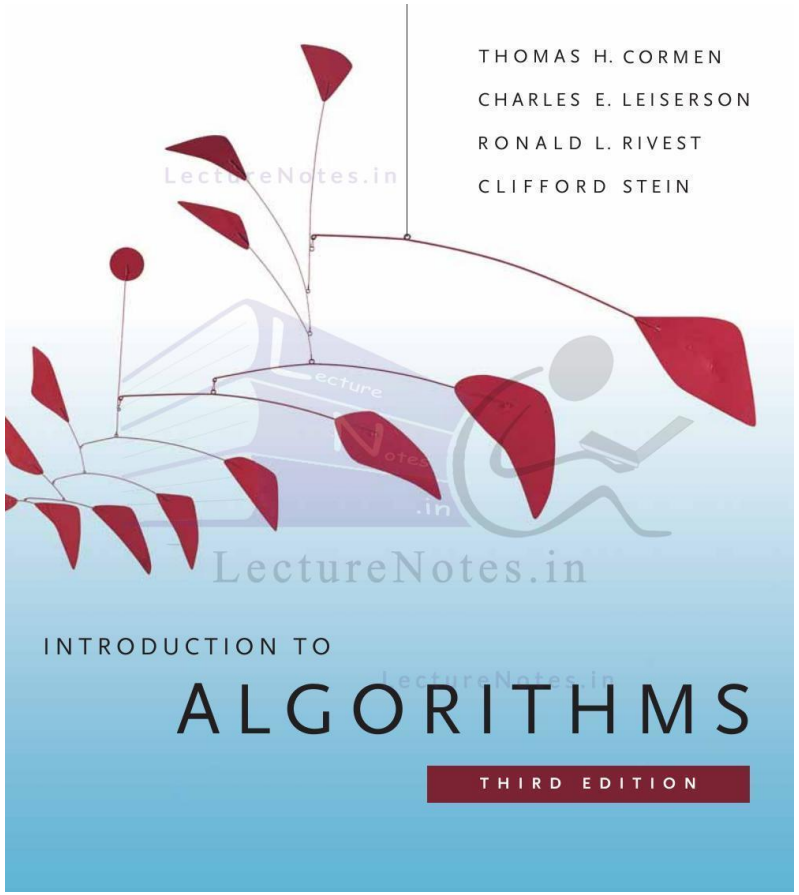
- What's allowed?
  - Working with others on homework.
  - Looking at someone else's class notes outside of class.
  - Take help and **cite** outside source (blog, book, etc.)
- What's not allowed? (These are just examples!)
  - Copying someone else's homework solutions.
  - Directly copying homework solutions from the internet.
  - Using notes during exams.
  - Using a cell phone to ask someone for answers to an exam.
  - If unsure, ask the instructor!
- ***Don't cheat! I don't want you to get suspended!***

CIS 675: Textbook

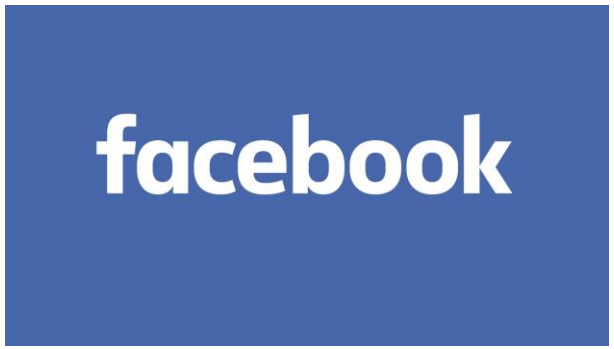
You do not need a textbook for this course, but if you would like to purchase one for review, I recommend the following two books:

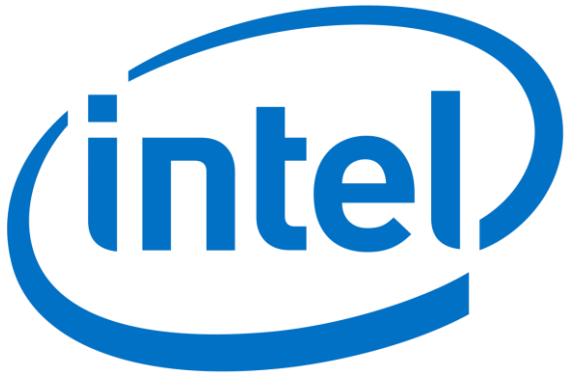
- CLRS: "Introduction to Algorithms",
- Kleinberg+Tardos, "Algorithm Design"





CIS 675: What is common?





Who has smallest SU ID in the first row?

When we can not memorize any number!

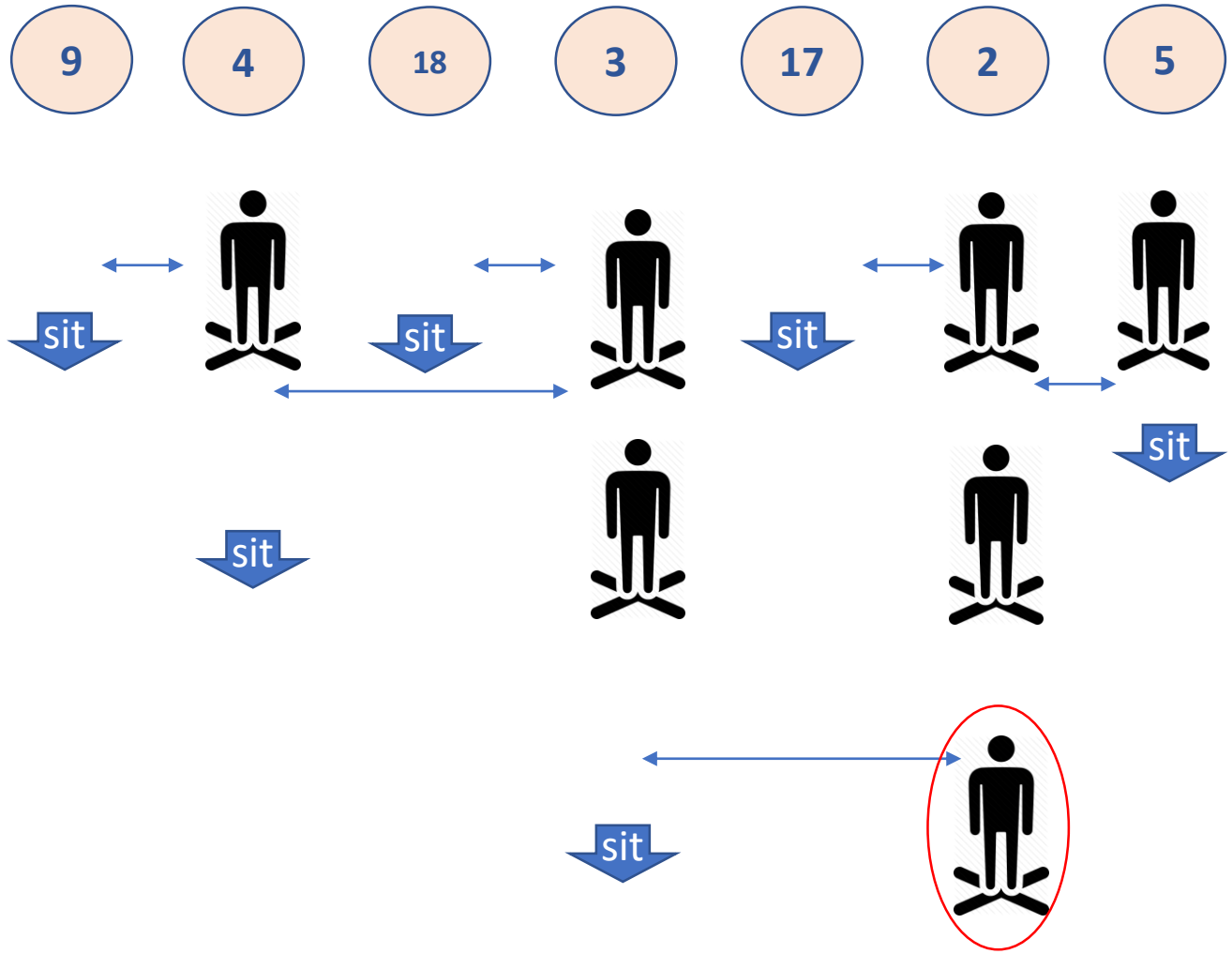
9 4 18 3 17 5 2

Who has smallest SU ID in the first row?

When we can not memorize any number!

1. Stand
2. Greet a neighbor (stop if you are the only person standing) (do not communicate with more than one!)
3. If you have larger SU ID sit
   If you have smaller SU ID compared to your neighbor's, remain standing
4. If you are standing & you have neighbor, go to 2

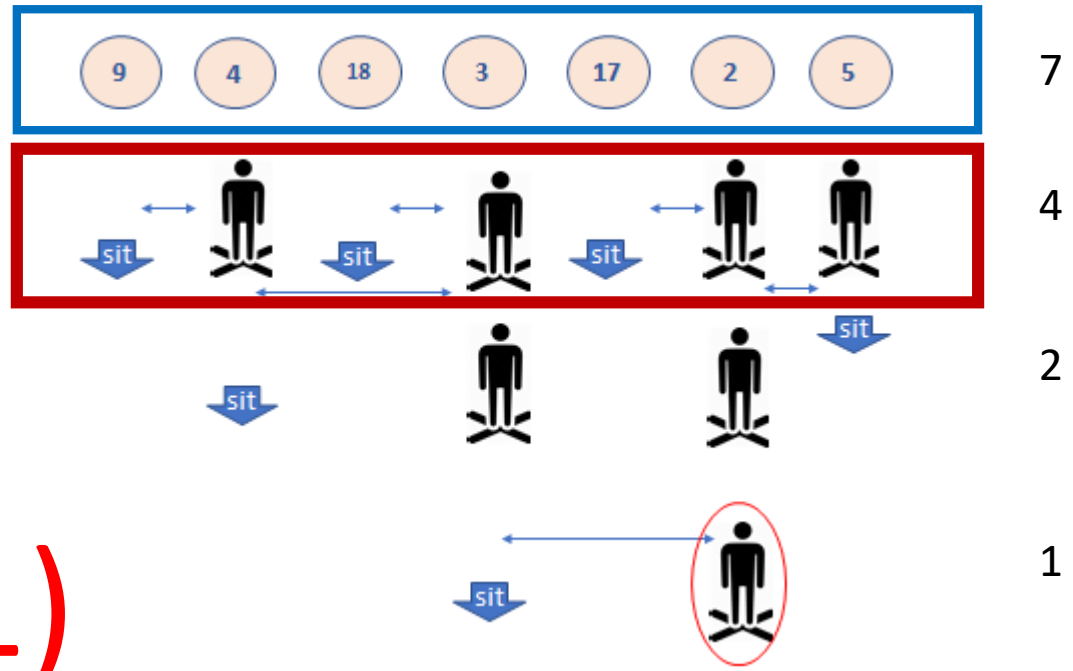
Example



1. Stand
2. Greet a neighbor
3. • If you have larger SU ID sit
   • If you have smaller SU ID remain standing
4. If you are standing & you have neighbor, go to 2

How fast does it work?

T(n)= 1 T (⌈n/2⌉)



T(n)=1+T (⌈ n/2 ⌉) & T(1)=3

T(7)=1+T(4)

=1+1+T(2)

=1+1+1+3

= 6

$$\frac{n\times(n-1)}{2}$$

Theme

- Large Problems are difficult to solve
- Smaller problems are simpler!
- Let’s break the large problem to multiple smaller ones!

This is a demanding course that assigns several homeworks, and three exams.

How to learn in this class?

- No cookbook
- Develop general problem solving skills
- Understand known techniques
- Work with peers, but do not copy
- Ask question, come to the office hours, practice

But the knowledge and skills you will acquire through this course will help you throughout your professional career!!!