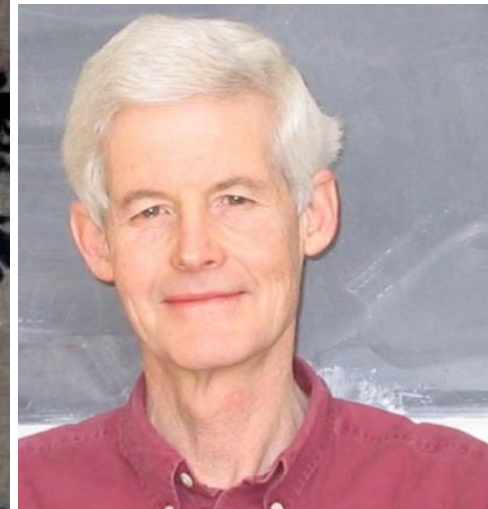
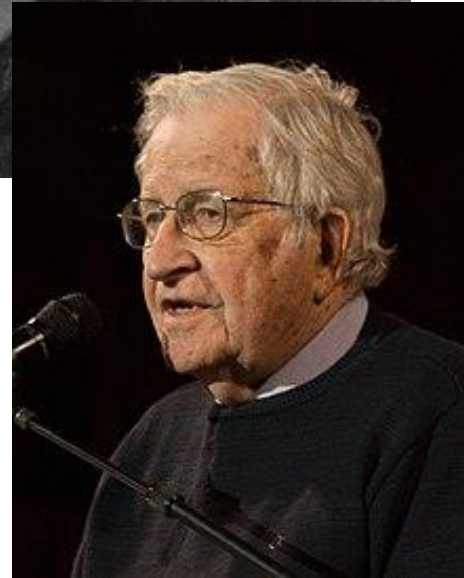
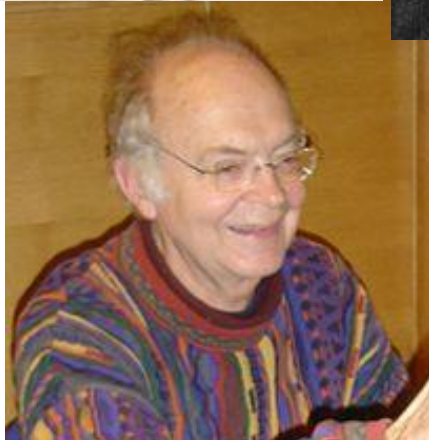
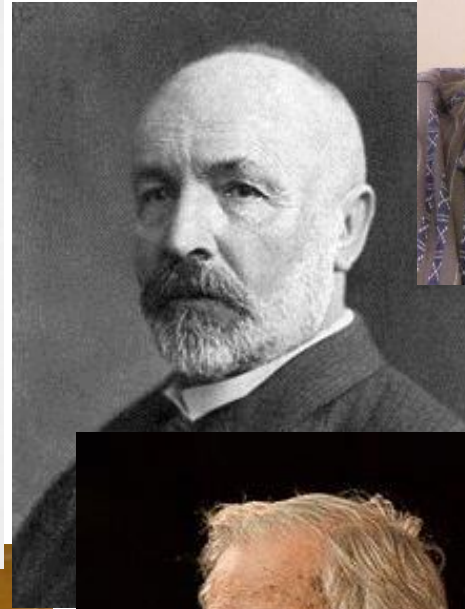
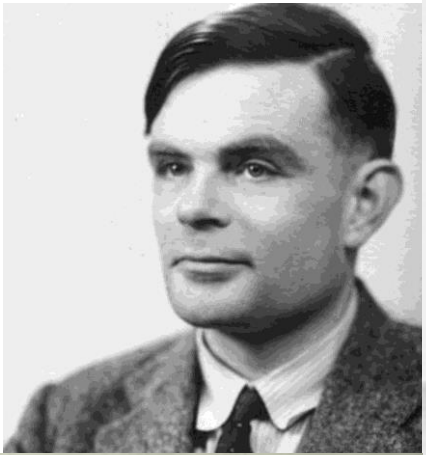


# CS3102 Theory of Computation

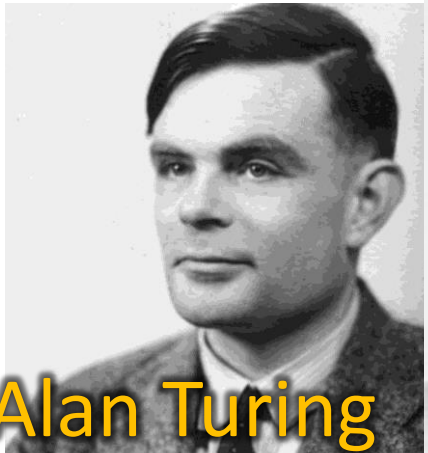
[www.cs.virginia.edu/~njb2b/cs3102](http://www.cs.virginia.edu/~njb2b/cs3102)





# CS3102 Theory of Computation

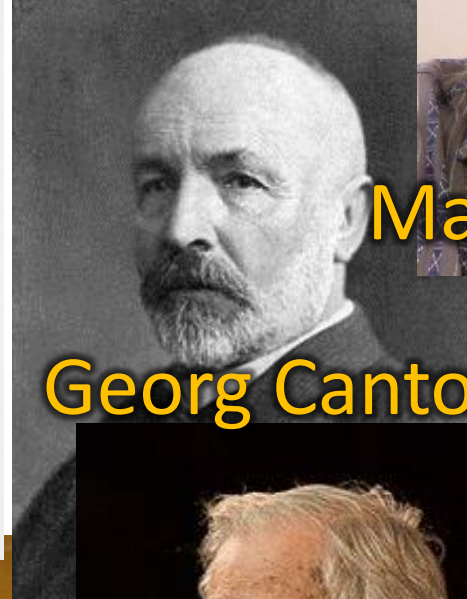
[www.cs.virginia.edu/~njb2b/cs3102](http://www.cs.virginia.edu/~njb2b/cs3102)



Alan Turing



Kurt Gödel



Georg Cantor



Manuel Blum



Leonid Levin



David Hilbert



Alonzo Church



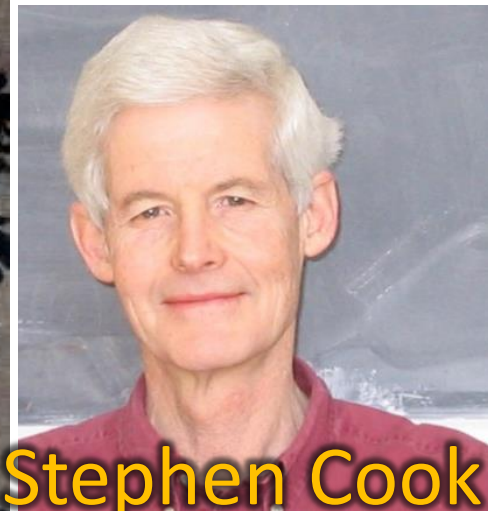
Donald Knuth



Noam Chomsky



Ada Lovelace



Stephen Cook

# Why Study Theory?



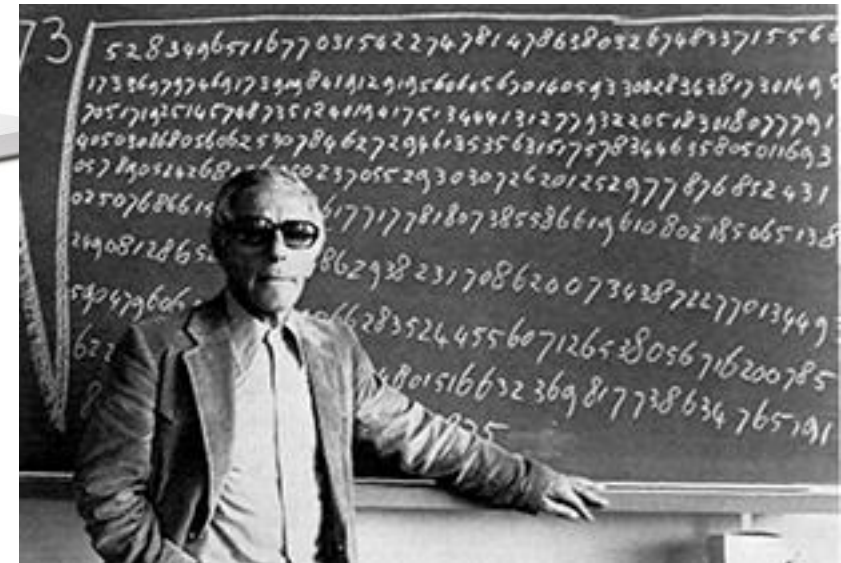
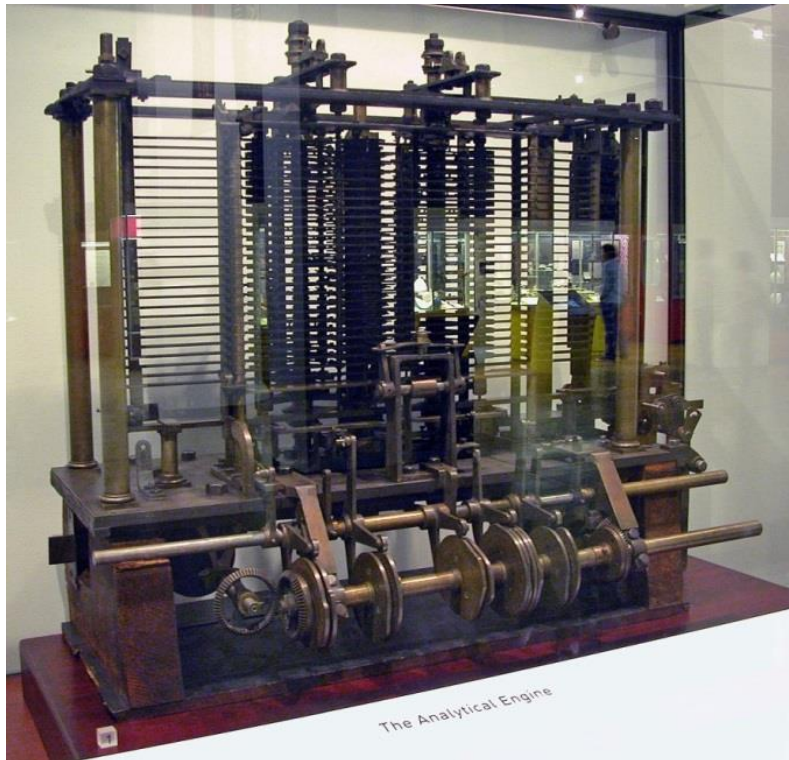
# Consider a Mayan Astronomer







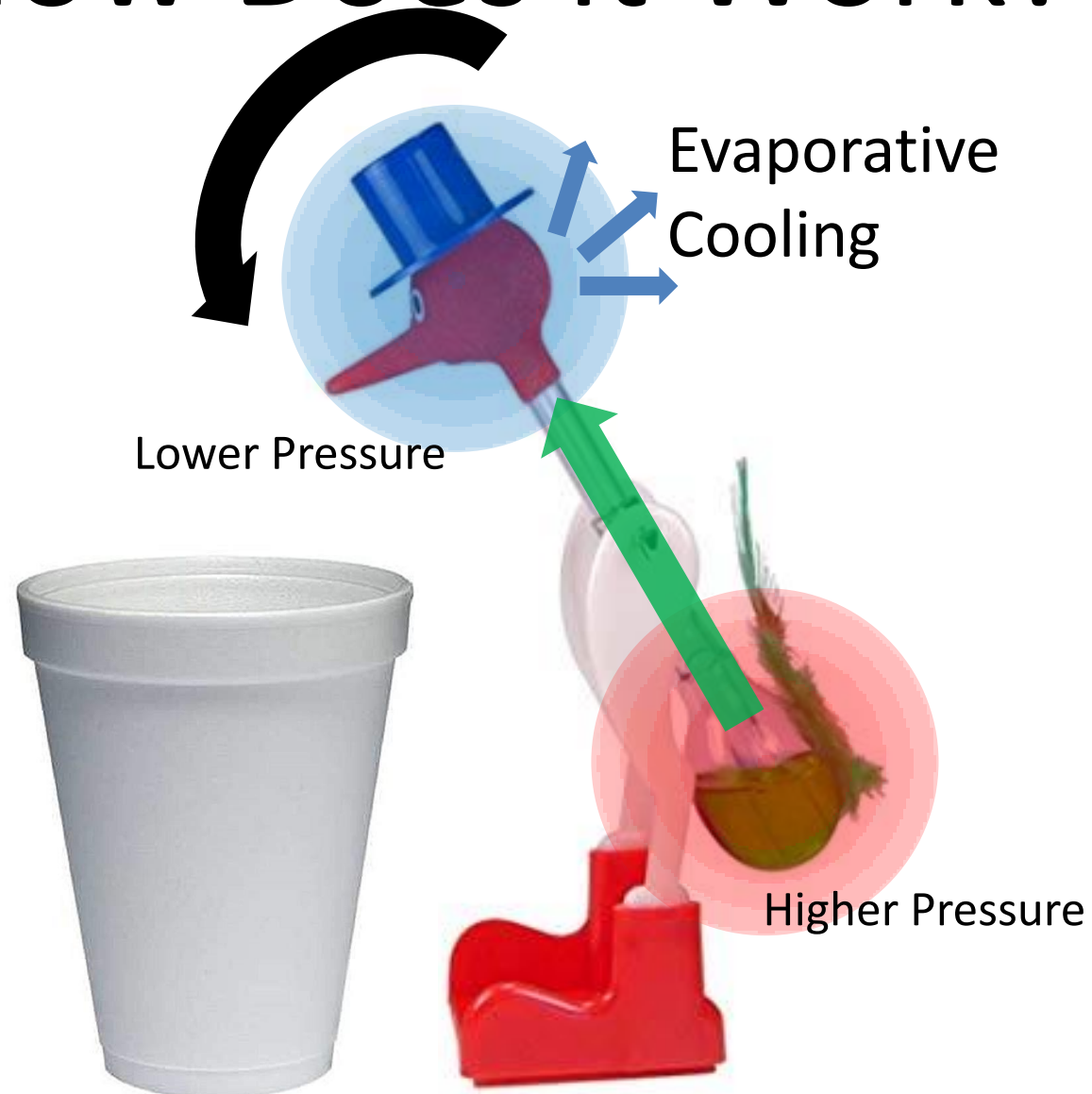
# Computers



# How Does it Work?



# How Does it Work?

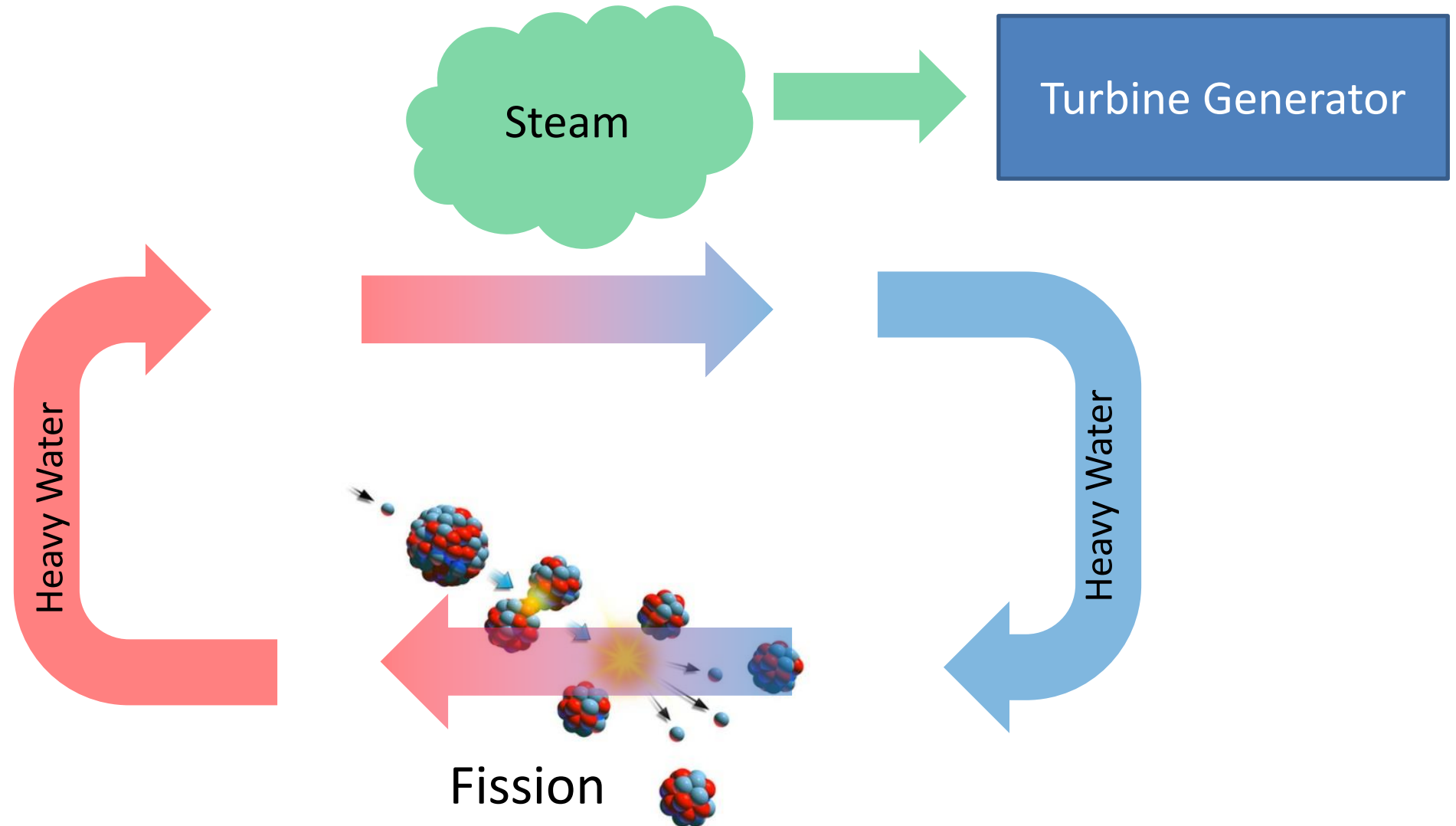


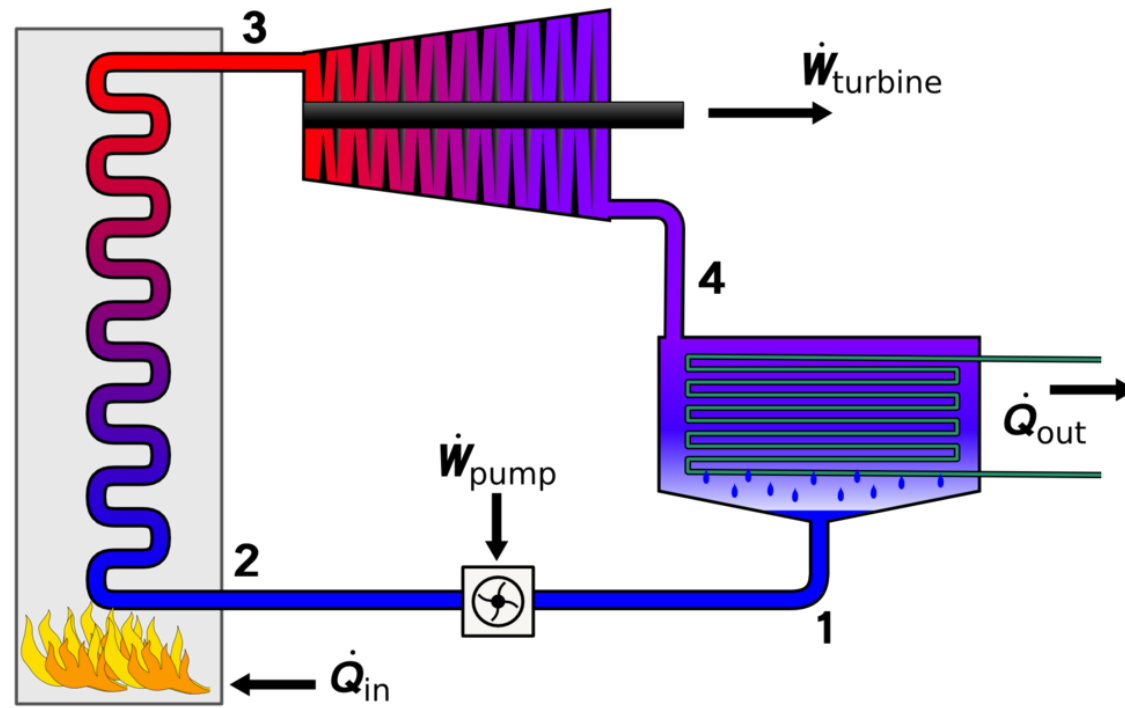
# How would I power Charlottesville with a drinking bird?





# How does a nuclear power plant work?





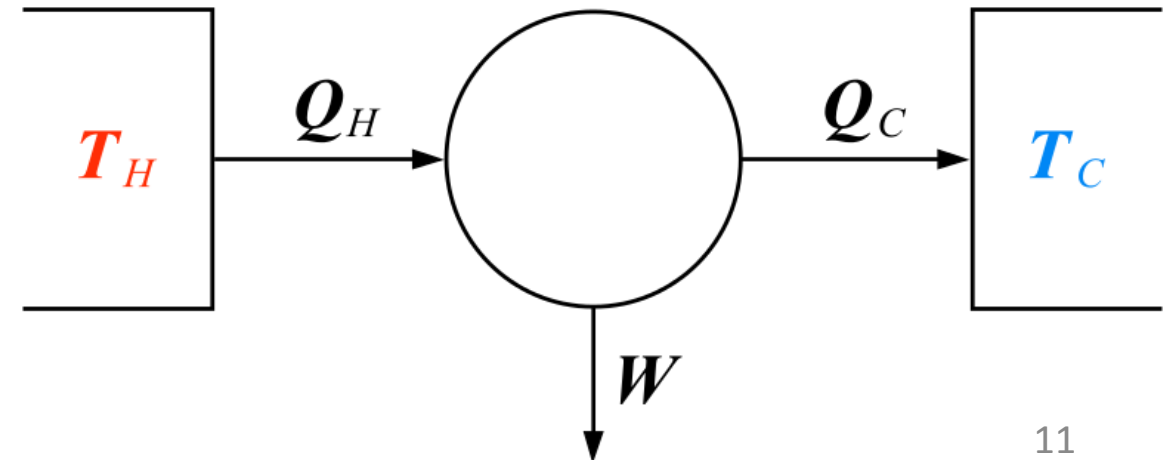


# Carnot Engine

- Model of *any* heat engine
- Independent of specifics of construction
- Provides fundamental limits on efficiency



Nicolas Léonard Sadi Carnot  
(1796-1832)



# Goals

- Create an awesome learning experience
- Instill enthusiasm for problem solving
- Give broad perspective on Computer Science
- Have fun!



# Warning

- This will be a difficult class
  - Material is very subtle
  - Focussed on making strong/elegant/compelling arguments
- Lots of opportunities to succeed!

# Office Hours

- Nate's
  - Rice 209
  - W 3:30pm-5:30pm
  - By appointment
- TA
  - TBD

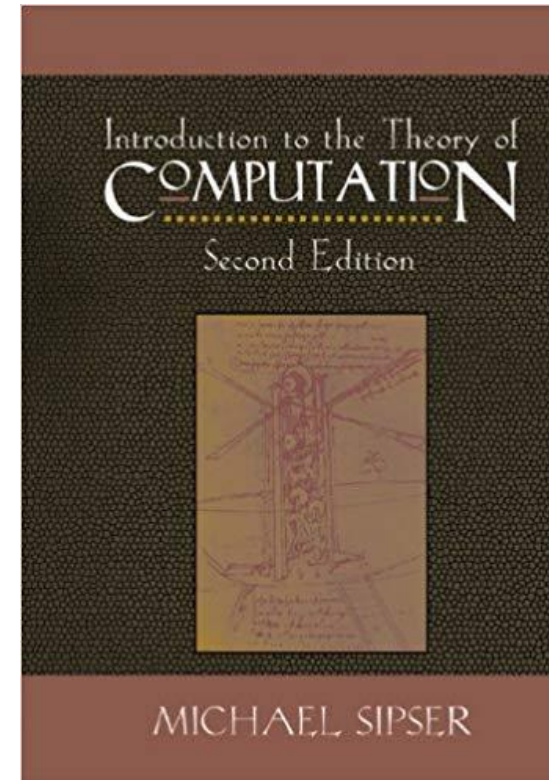
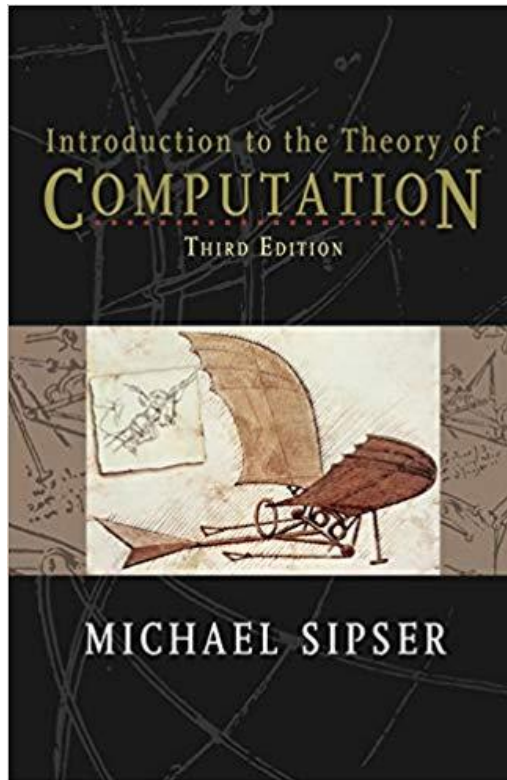


# Requirements

- Discrete Math (CS 2102)
- Software Development Methods (CS 2110)
- Tenacity
- Inquisitiveness
- Creativity

# Text

- Sipser, *Introduction to the Theory of Computation*. 2<sup>nd</sup> or 3<sup>rd</sup> edition



# Homework

- ~9 assignments total
- Mix of written and programming assignments
- Written:
  - 2/3 of all assignments
  - Must be typeset in LaTeX (tutorial is HW0)
  - Submit as zip folder containing tex file and pdf
- Programming:
  - 1/3 of all assignments

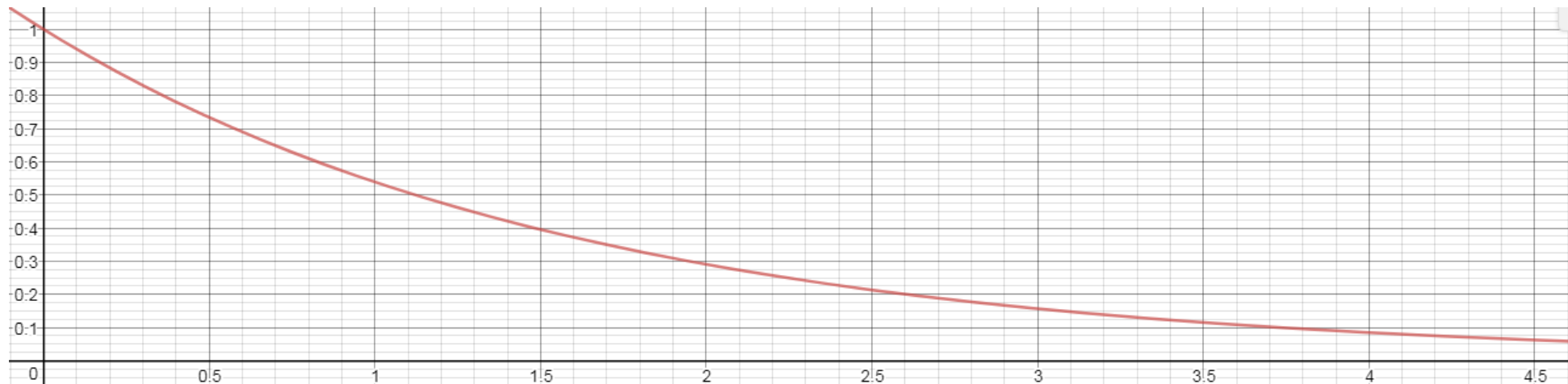
# Academic Integrity

- Collaboration Encouraged!
  - Groups of up to 4 per assignment (no limit on extra credit)
  - List your collaborators
- Write-ups/code written independently
- Be able to explain any solution you submit!
- DO NOT seek published solutions online



# Late Policy

- $grade = grade_{earned} e^{-\frac{1}{\phi} days}$
- Exponential decay
- Accepted until solutions posted



# Exams

- Midterm
  - Est. March 5
  - Take home / in-class hybrid
- Final
  - Registrar's official date/time
  - Saturday May 6, 9am

# Grade Breakdown

- 60% homework
- 20% Midterm
- 20% Final
- 10% Extra Credit
- 1% Questionnaire

# Questionnaire

- Due TONIGHT!
  - I expect it will take ~15 minutes
- I will use this feedback when making decisions about lecture/assignment content



# Questionnaire

- Due TONIGHT!
  - I expect it will take ~15 minutes
- I will use this feedback when making decisions about lecture/assignment content


# Regrades

- Conducted in person
  - Office hours in syllabus/on calendar

# Extra Credit

- Given for implementations of course content
  - Turing machine simulators
  - GUIs for programming assignments
  - Videos/graphics of concepts
  - Extensions of programming assignments
  - Another idea? Just ask!
- Must be something you can “show off”

# Feedback

- I am not a course dictator, I am a civil servant
- I'm open to any suggestion to help you learn
- Let me know!
  - In person
  - Email
  - @ProfNateB 



# Waitlist