CSSE 220 Day 23

Exam Review

Minesweeper mine placement

Hardy Efficiency

CSSE 220 Day 23

- Reminder: Exam #2 is this Thursday
  - In order to reduce time pressure, you optionally may take the non-programming part 7:10-7:50 AM.
  - You may bring one piece of paper with notes for the first part.
  - Same resources as last time for the programming part.
- Markov Milestone 2 due Friday 5 PM
- Begin thinking about Spell-check program
- You can still do the Mini-project partner surveys this morning
- Blood Drive today and tomorrow – Union

Today's Agenda

- Answers to your questions in preparation for the exam
- Some (not-so stupid) Minesweeper tricks.
- A look at my Hardy solution
- Empirical analysis of an algorithm.
- More on Linked Lists?

Answers to your questions

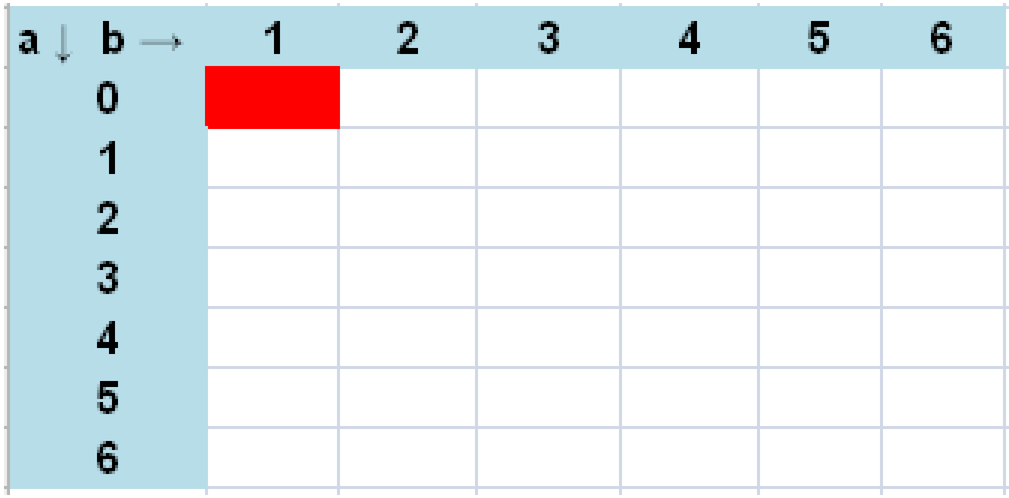
- Abstract Data Types and Data Structures
- Collections and Lists
- Markov
- Exam
- Material you have read
- Anything else

Minesweeper tricks

- Picking random locations for mines
- Counting neighboring mines

A Hardy Algorithm

- total = $a^3 + b^3$.
- One way to move through **a** and **b** loops:



a ↓ b →	1	2	3	4	5	6
0	🟥					
1						
2						
3						
4						
5						
6						

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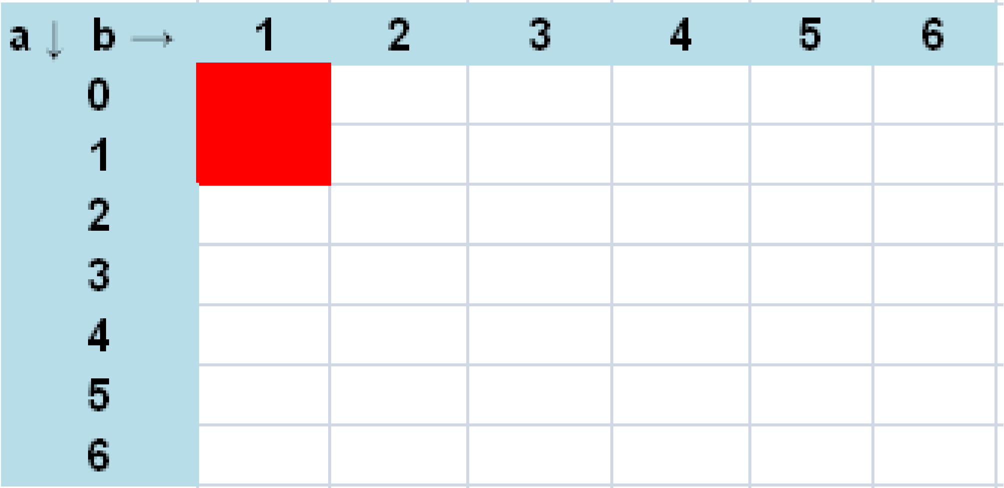

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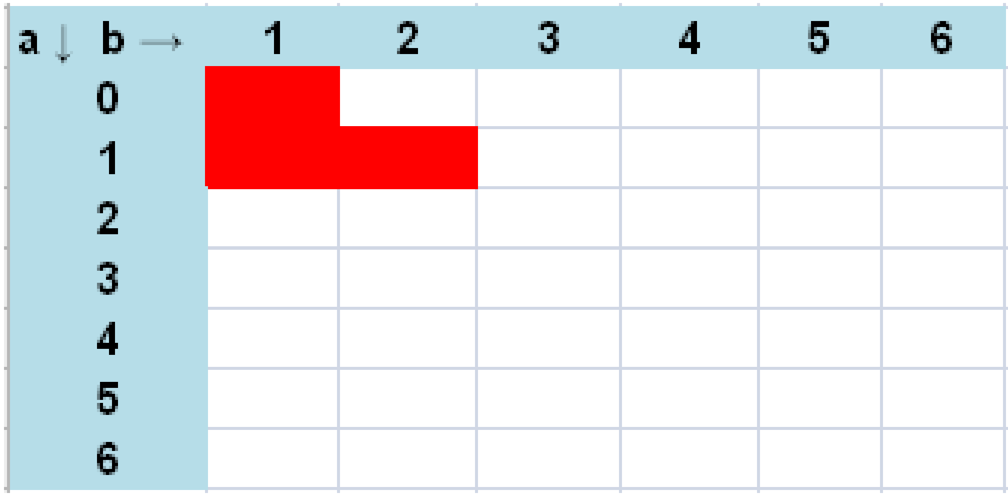

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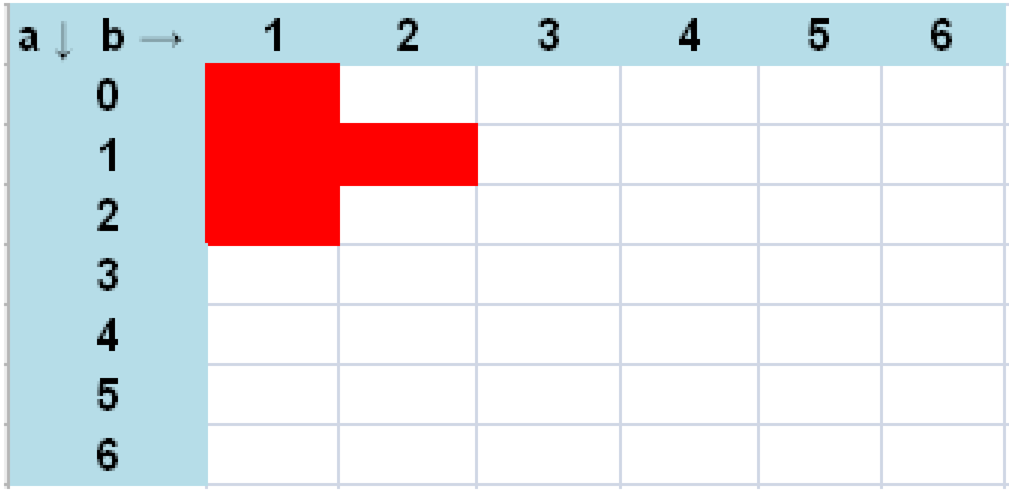

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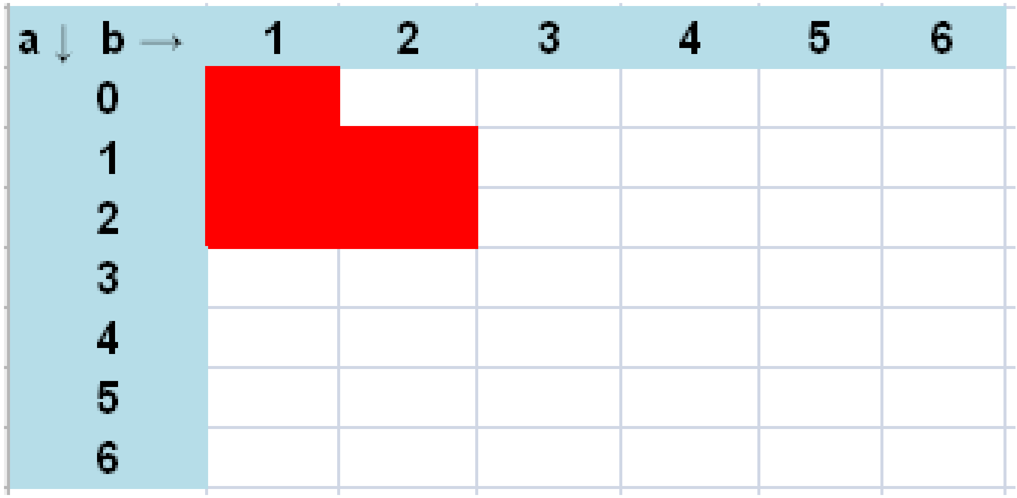

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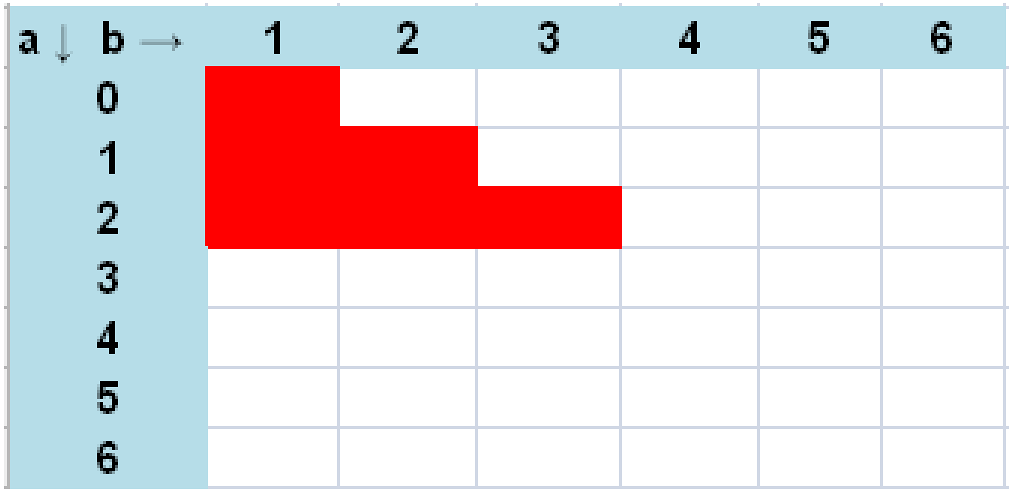

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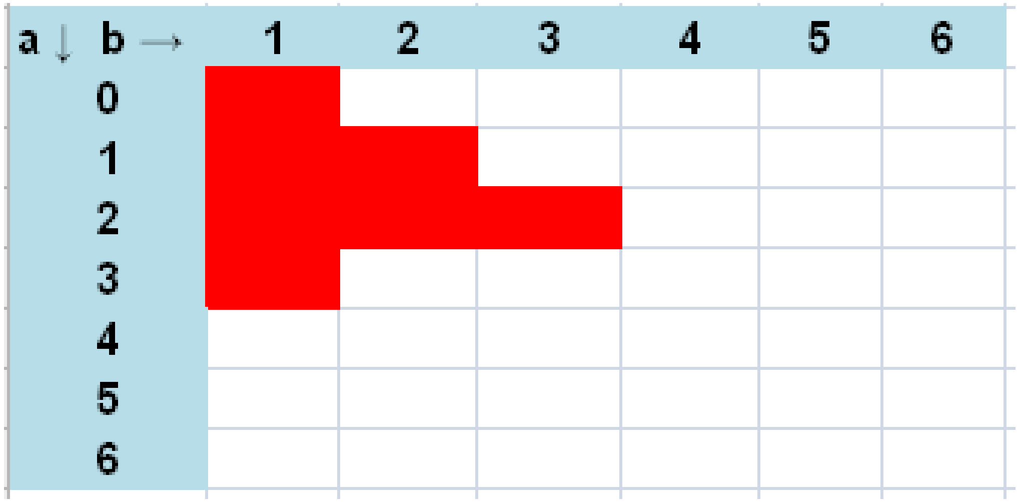

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0	🟥					
1	🟥	🟥				
2	🟥	🟥	🟥			
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Hardy Algorithm basic idea

- Go through the values of a and b in the order just described
- When we calculate each total
  - Look in table if we have seen that total before
  - If not, record its triple: (a, b, total) in table.
  - If so, record in the duplicates table
- When we get N items in the duplicates table
  - They may not be the N smallest. Sort them
  - See if we can find any others with sums smaller than the max of those N.
    - If, so, they will all have a **b** that is less than the cube root of this max. Find all of those and add to duplicates table.
- Sort again and pick out the Nth one.

Hardy Code

- Look at it together
- Ask questions about anything you don't understand.
- I'll ask you questions.
- We'll add some timing computations.
- Try to figure out a big-Oh estimate.
- Then see how much of a speed-up we get by using a faster data structure

Doubly-linked list

- Each node has two pointers, **prev** and **next.**
- There is one other new node, **tail**, whose **prev** pointer points to the node containing the last element of the list.
- This makes `remove()` easier to write
  - and it also makes an efficient **ListIterator** possible.

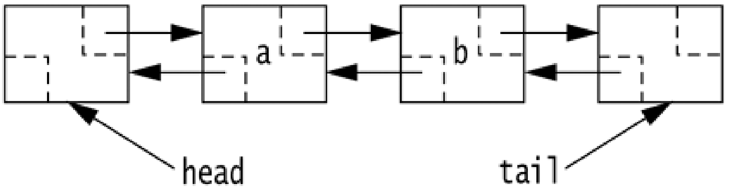

figure 17.15

A doubly linked list