Getting Started with a Problem

- "Eighty percent of success is showing up."
  - Woody Allen
- To successfully solve any problem, the most important issue to get actively involved.
  - The Principle of Intimate Engagement: You must commit to the problem
  - "Roll up your sleeves"
  - "Get your hands dirty."

Easy vs. Hard Problems

- Easy problems: See the answer
- Medium problems: See the answer once you engage
- Hard problems: You need strategies for coming up with a potential solution, sometimes for even getting started

Effective vs. Ineffective
Problem Solvers

Effective: Believe that problems can be solved through the use of heuristics and careful persistent analysis

Ineffective: Believe ``You either know it or you don't.''

Effective: Active in the problem-solving process: draw figures, make sketches, ask questions of themselves and others.

Ineffective: Don't seem to understand the level of personal effort needed to solve the problem.

Effective: Take great care to understand all the facts and relationships accurately.

Ineffective: Make judgments without checking for accuracy

Mental Toughness

- Need the attributes of **confidence** and **concentration**
  - Confidence comes with practice
  - Attack a new problem with an optimistic attitude
- Unfortunately, it takes time
  - Need to develop a life-long habit

Engagers vs. Dismissers

- Engagers typically have a history of success with problem solving.
- Dismissers have a history of failure.
- You might be an engager for one type of problem, and a dismisser for another.
- You can "intervene with yourself" to change your attitude of dismissal

The Mental Block

- Many students do significant problem solving for recreation
  - Sodoku, computer games, recreational puzzles.
- These same students might dismiss math and analytical computer science problems due to a historical lack of success (the mental block)
- To be successful in life you will need to find ways to get over any mental blocks you have
- Learn to transfer successful problem-solving strategies from one part of your life to other parts.
  - Example: Writing is a lot like programming

Example Problem

- Connect each box with its same-letter mate without letting the lines cross or leaving the large box.
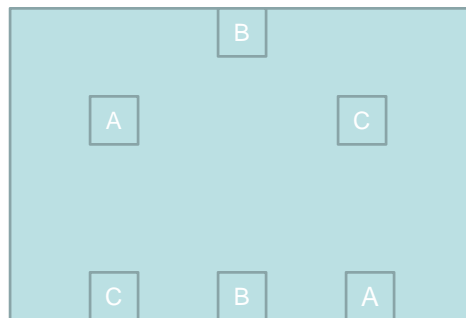
Engagement Example

- Cryptoarithmetic problem

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  A D
+ D I
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D I D
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"Real World" Engagement Examples

- Repairing something (dryer, toaster, etc.)
- Dryer example: Clean it out
- Table example: Look for the loose parts
- Car seat example: Reattach spring wire
- "Taking the time"
- You **can** screw something up or do something dangerous. But often you are not faced with such a prospect.
  - Some domains require that you study/practice/build expertise to be effective
  - The act of engagement can help you build domain knowledge

Overcoming Procrastination

- Writing/programming/project) procrastination
- Just sit down and write, don't care about quality to start
- Write whatever part of the document/program appeals. Don't do it start to finish.
- Schedule to work. Milestones, etc.
  - Commit to someone outside if that helps
  - Invent deadlines if you are deadline driven
- Do part of it at a time, over time
  - People don't write books, they write sections or pages
  - People don't write programs, they write functions, etc.

Six Myths about Reading

1. Don't subvocalize when you read
2. Read only the key words
3. Don't be a word-by-word reader
4. Read in thought groups
5. You can read at speeds of 1000 or more words a minute – without any loss of comprehension
6. Don't regress or re-read

There are no short cuts to comprehension!