

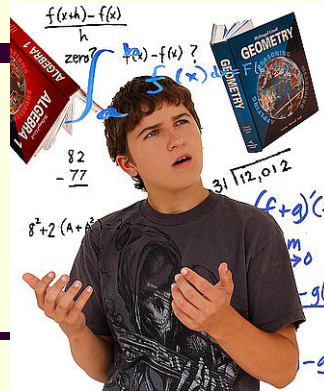
# How to Solve it

## CS 241

### Data Organization using C

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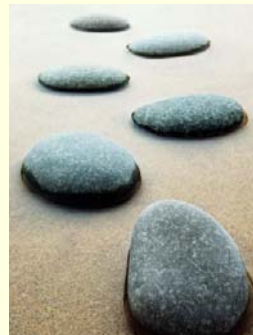
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## How to Solve it

"If there's a problem you can't solve, then there is a simpler problem that you can solve. Find it!"

-- **George Pólya** (1887 –1985)



## Scientific Thinking

- Figure out how to break hard problems down into smaller pieces, or consider an easy special case.
- Try out examples, see what works and what doesn't.
- When you've seen enough examples, formulate a general idea.
- Then try to think of counterexamples for that idea.

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## Hard Problems

In order to *learn* scientific thinking, you ***need hard problems.***

Problems that are too hard to solve all at once.

Whenever you are working near your limits, sometimes you will face a problem that, for now, is beyond those limits.



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## The Computer Science Club

If you find these problems hard, do not think you are dumb or that you are not "*cut out*" to be a computer scientist.

The problems are designed to be hard.

The person sitting next to you may have been programming since grade school, or have years of professional experience.



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## Learning Problem Solving

"Solving problems is a practical skill like, let us say, swimming. We acquire any practical skill by imitation and practice. Trying to swim, you imitate what other people do with their hands and feet to keep their heads above water, and finally, you learn to swim by practicing swimming. Trying to solve problems, you have to observe and to imitate what other people do when solving problems and, finally, you learn to do problems by doing them."

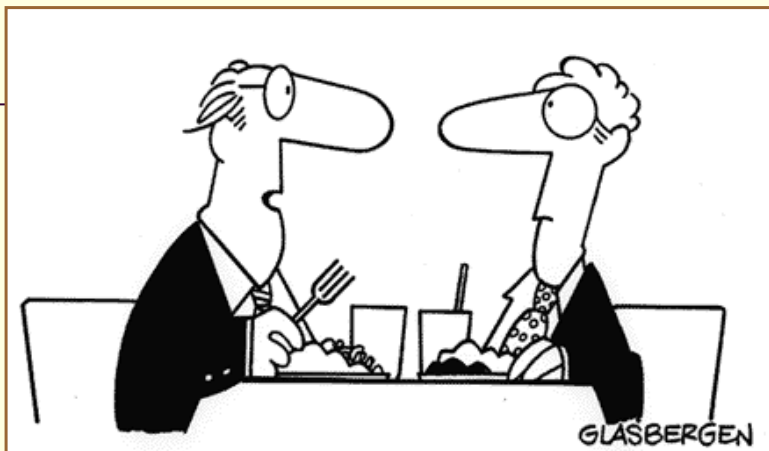
-- **George Pólya** (1887 –1985)

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"The secret is to swallow without chewing. That sends big chunks of food into your bloodstream. This forces your arteries to open wider, which increases blood flow to the brain, which makes you smarter and more successful!"

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"The reason I'm successful is because I'm lucky. But I didn't get lucky until I started working 90 hours a week."

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