

# A USEFUL “BAG OF TRICKS”

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Being a student can sometimes be difficult. Why? Well, often I find that it’s not the material that’s so hard to learn. Most people do not know how to learn, lack basic organizational skills, have absolutely no clue how to manage their time effectively, and are grossly inefficient at processing and storing information. Truly, we all share some or all of these characteristics at one point or another in our lives, but very few people actually figure out how to regularly do these seemingly common things well. To develop these skills requires practice, often on our own. It’s not particularly glamorous.

With that in mind, I offer my “Bag of Tricks.” I use these myself very often and encourage you to do the same.

0. *What is the problem?* If you don’t have a clear understanding of the problem, you will never be able to solve it. Period.
1. *Simplicity is, well, simple.* Give yourself a simpler problem. Try to find the trivial or base case. It greatly reduces the difficulty.
2. *Doodling is fun!* Draw pictures and diagrams to help you solve the problem. Few can think in math and formulas. Most of us are visual.
3. *Split it up.* Solving parts of the problem and then putting it all together often helps if that’s possible. This is exactly what we do when we design complex algorithms.
4. *Work from both ends.* If you know what the outcome or solution is supposed to look like, then use that to help solve the problem. It could reveal ideas and shortcuts.
5. *Similarity, my dear Watson.* Many problems are similar in nature. Try to see if a problem is the same thing as another you’ve previously solved or know something about. There’s nothing wrong with reusing old material if it is relevant.
6. *Does it make sense?* Often, students accept a first hack at an answer, forget to ask themselves this important question, and do not notice how nonsensical their answer might be. Ask yourself if an answer makes sense before you commit to it. This will avoid turning in assignments that contain unedited (and often unread) cut-and-pasted material from the Web with phrases like, “Click here for a detailed explanation.” I wonder what I’m supposed to click with. And yes, this has actually happened. This is probably the most ignored trick and the most annoying to a prof who is grading your assignment.
7. *If time permits, optimize.* It’s never a bad thing to eliminate redundancy and optimize your solution to the problem.
8. *Don’t give up!* Seriously, don’t give up. If you need help, discussing general ideas with your fellow classmates is a good thing. However, you should refrain from discussing things that are too specific (e.g., code). Furthermore, I will always be glad to help you **if you show me that you have reasonably thought about the problem first.**
9. *Confidence is crucial.* A lack of it can actually be quite deadly.