

**CHAPTER 7**  
**Homework and Exams**

## General Rules

1. As soon as you can, psych out the professor and the poor, overworked, grader, if the professor has one. Find out what they like and don't like. Then, make it one of your goals to make them feel that you are on *their* side, that you are working for *their* success. Make things as easy as possible for them. Remember that, like you, they would much rather be doing something else: in their case, what they will be rewarded for, namely, research.

2. Write clearly! I say this even though, in primary school, and perhaps middle school (jr. high), it may have been a winning strategy to make it difficult for a teacher to figure out what you actually wrote down.

“A teacher who asks a question is tuned to the right answer, ready to hear it, eager to hear it, since it will tell him that his teaching is good and that he can go on to the next topic. He will assume that anything that sounds close to the right answer is meant to be the right answer. So, for a student who is not sure of the answer, a mumble may be his best bet. If he's not sure whether something is spelled with an *a* or an *o*, he writes a letter that could be either one of them...

“Game theorists have a name for the strategy which maximizes your chances of winning and minimizes your losses if you should lose. They call it ‘minimax’. Kids are expert at finding such strategies. They can always find ways to hedge, to cover their bets.” — Holt, John, *How Children Fail*, Dell Publishing Co., Inc., N.Y., 1964, pp. 34-35.

I once tutored a jr. high school student who was an absolute master of this technique. The more unsure she was about what she was doing, the fainter her handwriting became, and the more flourishes it contained. If I asked her a question about her solution, she had a way of brushing the question aside with a wave of her hand and with words that said, “Please, Bill, if you don't get my solution, I'd really prefer not to spend time explaining it right now. Couldn't we go on to the next problem? (I've got to go to the game.)” And I have to admit, so good was she at this ploy that I felt embarrassed to even *think* about asking her if that was an *x* or a *y* in the third line, and if the answer she had written was 54 or 34 or 59 or 39 or ... If she had said, “Bill, I don't always have time to *write down* the answer. That's not the way I work,” I would (for a few moments) have been ashamed of my slowness in recognizing the genius I had before me.

In the computer industry, I once knew a woman who often applied the same strategy when someone asked her about a piece of software which was new to her but which she was supposed to learn. She would do a dazzling performance at the keyboard and mouse, fingers racing over the keys, mouse clicking everywhere, all the

while carrying on a running dialogue along the lines of, “OK, let’s see (*damn!* fingers just aren’t working this morning. Where’s my coffee?) OK, so we want to (*what?* [clicking the mouse button repeatedly] this mouse is *useless.*) OK so we want to (*there*) Now, let’s see, I don’t know why they’re giving us all *that* (this is a *terrible* interface) OK, OK, now all we have to do is (*damn*, this machine is slow, let me try again) OK, so...” And, eventually, with enough of this thrashing, she would succeed in accomplishing at least one of the things she set out to do. I was naive enough to suggest (once) that maybe we — she and I — should sit down and record the steps that actually worked to accomplish each thing. Then we wouldn’t have to keep repeating the process of trial-and-error. She gave me a withering look which said, in no uncertain terms, “Come on, Bill. Are we computer professionals or not? (My God!)”

*Nevertheless*, in graduate school I found I always did better as far as partial credit was concerned, by writing very clearly all the time and stating what I knew and what I didn’t know when I was stumped. The reason, I think, was that such behavior said to the grader, “Here is an intelligent person, a *smart* person (in other words, one of Us). True, he doesn’t always know how to solve the problem, but he knows how to proceed, he knows what he doesn’t know, he’s — well, smart.”

“The test of intelligence [is] not how much we know how to do, but how we behave when we don’t know what to do.” — Holt, John, *How Children Learn*, Dell Publishing Co., Inc., N.Y., 1967, p. 116.

3. Convince the grader that you know what you’re doing *even though you may not have time to do it, and even though you may make mistakes in doing it.*

This is where heuristics and structural thinking come in. Unless you have very good reason to do otherwise, always use a top-down approach in homework and in exams. This means, in all problems whose solution you are not confident you know, tell the *Whats* first: “We would have our proof if we could show that ... Now, we know that...” (here you list any theorems, facts, you *do* know that you think might in any way be relevant). Then, you write: “The best starting point seems to me to be...” at which point you start from there, *reasoning on paper — thinking out loud — as you go.* (*Show them how smart you are even when you don’t know the answer!*) I have gotten more mileage out of this technique, especially in exams, than from any other. The reason, I think, is obvious, namely, that it says to the person grading the paper, “*This student is intelligent; he or she knows how to go about solving a problem; he or she has learned something in this class; he or she — is one of us!*” Help them to believe that you are working for their success.

4. Learn “test-craft” (analogous to tradecraft in the spy business). There are many good books on improving your ability at taking tests, so I won’t try to repeat that material here. But I do want to repeat what I said earlier in this book, namely, that you should dismiss forever from your mind the superstition that only losers read books on improving their ability as students and, in particular, on taking tests. In my experience, precisely the opposite has been the case: it is the winners who are most interested in learning the tricks and techniques that will enable them to continue to be winners and do it with less effort and anguish than before.

One thing you should make a habit of, is getting as much information out of the professor *before* the exam, about exactly what will be on the exam: “Excuse me, Professor —, but some of us are carrying extra courses this semester, so, we’d appreciate it if you could give us some indication of what you think is most important for the exam.” (*Never* say, merely, “what is important,” because that implies there are parts of the subject that are not important, and we *never* suggest such a thing to a person who is devoting his entire life to the subject!)

5. Develop the discipline of giving up on a problem when it is taking too much time. I know from personal experience how hard this is. (“If I could get this one, then I’d be OK!”) Nevertheless, this is the discipline you have to learn. Your goal is to win the war — get a good grade in the course, get your diploma or degree, and with that get a job — not win every battle.

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