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Successful Strategies for Solving Problems on Assignments

Solving complex problems is a challenging task and warrants ongoing effort throughout your career. A number of approaches that expert problem-solvers find useful are summarized below, and you may find these strategies helpful in your own work. Any quantitative problem, whether in economics, science, or engineering, requires a two-step approach: analyze, then compute. Jumping directly to "number-crunching" without thinking through the logic of the problem is counter-productive. Conversely, analyzing a problem and then computing carelessly will not result in the right answer either. So, think first, calculate, and always check your results. And remember, attitude matters. Approach solving a problem as something that you know you can do, rather than something you think that you can't do. Very few of us can see the answer to a problem without working through various approaches first.

Analysis Stage

- Read the problem carefully at least twice, aloud if possible, then **restate the problem in your own words.**
- **Write down all the information that you know** in the problem and separate, if necessary, the "givens" from the "constraints."
- **Think about what can be done with the information that is given.** What are some relationships within the information given? What does this particular problem have in common conceptually with course material or other questions that you have solved?
- **Draw pictures or graphs** to help you sort through what's really going on in the problem. These will help you recall related course material that will help you solve the problem. However, be sure to check that the assumptions underlying the picture or graph you have drawn are the same as the assumptions made in the problem. If they are not, you will need to take this into consideration when setting up your approach.

Computing Stage

- If the actual numbers involved in the problem are too large, small, or abstract and seem to be getting in the way of your thinking, **substitute simple numbers and plan your approach.** Then, once you get an understanding of the concepts in the problem, you can go back to the numbers given.
- **Once you have a plan, do the necessary calculations.** If you think of a simpler or more elegant approach, you can try it afterwards and use it as a check of your logic. Be careful about

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changing your approach in the middle of a problem. You can inadvertently include some incorrect or inapplicable assumptions from the prior plan.

- Throughout the computing stage, pause periodically to **be sure that you understand the intuition behind each concept in the problem.** Doing this will not only strengthen your understanding of the material, but it will also help you in solving other problems that also focus on those concepts.

- **Resist the temptation to consult the answer key** before you have finished the problem. Problems often look logical when someone else does them; that recognition does not require the same knowledge as solving the problem yourself. Likewise, when soliciting help from the AI or course head, ask for direction or a helpful tip only—avoid having them work the problem for you. This approach will help ensure that you really understand the problem—an essential prerequisite for successfully solving problems on exams and quizzes where no outside help is available.

- **Check your results.** Does the answer make sense given the information you have and the concepts involved? Does the answer make sense in the real world? Are the units reasonable? Are the units the ones specified in the problem? If you substitute your answer for the unknown in the problem, does it fit the criteria given? Does your answer fit within the range of an estimate that you made prior to calculating the result? One especially effective way to check your results is to work with a study partner or group. Discussing various options for a problem can help you uncover both computational errors and errors in your thinking about the problem. Before doing this, of course, make sure that working with someone else is acceptable to your course instructor.

- **Ask yourself why this question is important.** Lectures, precepts, problem sets, and exams are all intended to increase your knowledge of the subject. Thinking about the connection between a problem and the rest of the course material will strengthen your overall understanding.

If you get stuck, take a break. Research has shown that the brain works very productively on problems while we sleep—so plan your problem-solving sessions in such a way that you do a "first pass." Then, get a night's rest, return to the problem set the next day, and think about approaching the problem in an entirely different way.

References and Further Reading:

Adapted in part from Walter Pauk. *How to Study in College*, 7th edition, Houghton Mifflin Co., 2001