Answers to homework problems should include any computations necessary to get the final answer. To receive full credit, you must also explain what you've done and why you did it. You should write in complete sentences with (reasonably) correct grammar. Granted, this is not a writing intensive course, but it *is* a 5000-level mathematics course, and at this level you're expected to be able to explain your work in a coherent, organized and logical manner.

Note that many of the problems in the textbook have answers in the back. If I assign any of those, explaining your reasoning becomes even more important, because it's assumed you have the right answer. In other cases it might be a good idea to do those problems and check your answers before working on the assigned problems.

**Chapter 3:** 3.02, 3.05, 3.06. Also add:

3.A: Does there exist an instantaneous uniquely decipherable binary code with word lengths 1, 2, 2, 3, 3? If so, construct an example. If not, prove it, and explain how to modify the alphabet $\Sigma$ to create such a code with those word lengths.

3.B: For each of the following sets of codewords, explain if the code is instantaneous.

$$\{1, 01, 001, 0001, 00001, \ldots\}$$
$$\{1, 10, 100, 1000, 10000, \ldots\}$$
$$\{1, 01, 001, 000\}$$

**Chapter 4:** 4.03, 4.04, 4.06, (Update: omit 4.07), 4.11. Also add:

4.A: Explain why the following noisy channel with alphabet $\{0, 1\}$ is useless for sending information:

$$P(0 \text{ received } | 0 \text{ sent}) = p$$
$$P(0 \text{ received } | 1 \text{ sent}) = p$$
$$P(1 \text{ received } | 0 \text{ sent}) = 1 - p$$
$$P(1 \text{ received } | 1 \text{ sent}) = 1 - p$$