Due Wednesday, 11/29

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. Even if I don't assign them, it might be a good idea to do those problems and check your answers before working on the assigned problems.

Chapter 12: 12.01, 12.02, 12.04 (we didn't do this with the Hamming Code specifically, but we've done lots of similar calculations in the past, and there's an example in the book you can read), 12.13.

12.A Do 12.15, and then add: using an equivalent generating matrix in standard form, calculate the codeword for a source word $abc \in \mathbb{F}_2^3$.

12.B Find the minimum distance of a *trinary* linear code with generating matrix

$$G = \begin{bmatrix} 0 & 1 & 2 & 1 \\ 1 & 0 & 2 & 2 \end{bmatrix}.$$

How many errors can it detect? How many can it correct?

12.C Find generating matrices in standard form for the following codes. (Hint: first determine $[n, k]$. Then you know G should be a $k \times n$ matrix.)
(1) The binary repetition code $\{00000, 11111\}$.
(2) The binary code consisting of three digits plus an even parity check bit. (Note that the sum of all digits in a valid codeword will be 0 in $\mathbb{F}_2$.)