Binary Codes and Parity-Check Sums

Read the book chapters first, then make sure you can answer the questions in the notes. Following that, work on some skills-check problems and exercises. Then take the online quizzes.

Reading 17.1, 17.2
Skills Check 2, 3, 4, 5, 6, 7, 8, 9
Exercises 1, 2, 3, 4, 5, 6, 8, 9, 10, 14
Quiz Take the quiz[1]

17.1

- In Figures 17.1 and 17.2, describe how the initial signal of 4 binary values turns into 7 binary values.
- Repeat by producing the diagrams for other sets of 4 binary values.
- In Figure 17.3, describe how we can detect something is wrong with our 7-digit transmission, and how to fix it.
- Try some combinations of 7 binary digits that are not in the list of code words in table 17.1. Use the diagrams method to find out how to "correct" them.

17.2

- What are *parity check sums*, and why are they called that?
- What do we call the *distance between two strings*? (This is also called the Hamming distance)
- Describe how the *Nearest-Neighbor decoding* works.
- What do we refer to as a *binary linear code*? What are the *code words* in that case?
- What is the *weight* of a binary linear code?
- Relative to the weight, how many errors can we detect in a linear code?
- Relative to the weight, how many errors can we correct in a linear code? How do we actually correct errors?
- If a code has weight 2, how many errors can it detect? How many errors can it correct?

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[1]https://moodle.hanover.edu/mod/quiz/view.php?id=5155