

Homework Assignment 2 **Final version**
Due 9am February 2, 2001

Reading: Wicker, Chapter 2, Section 8.1, pp. 176–183.
RJM “Chapter 9”, pp. 1–18, 21–24, 29–33.

Problems to Hand In:

Problem 1. RJM Chapter 9, Problem 9.10.

Problem 2. RJM Chapter 9, Problem 9.15. [Note: the vector V should be defined as

$$\mathbf{V} = (0, \beta^4, \beta^5, 0, \beta^7).]$$

Problem 3. Let α be a primitive root in $\text{GF}(8)$ satisfying $\alpha^3 = \alpha + 1$, and let V denote the length-8 vector $(\alpha, 1, 0, 0, 0, 0, 0)$. Compute the corresponding quantities $\sigma(x)$, $\omega(x)$, and \widehat{V} . Verify that the components of \widehat{V} satisfy a circular recursion corresponding to the polynomial $\sigma(x)$.

Problem 4. RJM Chapter 9, Problem 9.32. Please use both the time domain and the frequency domain completion.

Problem 5. Consider the following partly erased codeword from the $(7, 3)$ RS code from Example 9.8:

$$(1, \alpha, \alpha^2, *, *, *, *).$$

Assuming there are no errors, use the RS errors-and-erasures decoding algorithm to fill in the four erasures and thereby “encode” the information block $(1, \alpha, \alpha^2)$.