Math 350
Spring, 2000

HOMEWORK #7

Do 100 points of the following problems (due 3/16/00).

15 pts. **1** Define C to be self-dual if $C = C^\perp$. Find a generator matrix of a linear binary self-dual code of length 10.

15 pts. **2** Find the largest n so that there is a linear binary code with $d = 3$ and at most 3 redundancy bits.

20 pts. **3** Let $R_{r,q}$ denote the rate of the Hamming code $H(r, q)$. Find an equation for $R_{r,q}$, and calculate $\lim_{r \to \infty} R_{r,q}$.

⋆ 35 pts. **4** Show that the minimum distance of the ternary Golay code of length 11 is 5. You may either use the generator matrix on page 102, or you can construct a parity check matrix for this in the same spirit as Theorem 8.4.

20 pts. **5** Find all cyclic codes of length p over $GF(p)$, where p is a prime.

15 pts. **6** Find all ternary cyclic codes of length 6.

15 pts. **7** Find THE generating polynomial for the binary code of length 8 that is generated by $x^6 + x^4 + x^2$. What is its check polynomial?