Math 641, Fall 1999
R.A. Brualdi
Exercise Set 2, * exercises due Wednesday, September 29, 1999

1. Page 45-6: 3.8.10, 3.8.11, 3.8.13

* 2. Page 45: 3.8.12

* 3. Let C be a binary code. Prove:

(i) If C is self-orthogonal ($C \subseteq C^{\perp}$), and has a generator matrix each of whose rows has weight divisible by 4, then every codeword has weight divisible by 4.

(ii) If every codeword of C has weight divisible by 4, then C is self-orthogonal.

* 4. Let C be an $[n, k, d]$ code. Let T be a set of coordinate positions. The *shortened code wrt* T is the linear code C_T of length $n - |T|$ obtained from the codewords of C which are zero on T by deleting the coordinates in T. Denote the linear code obtained from C by *puncturing* on T (i.e. removing all coordinates in T) by C^T. Prove:

(i) $(C^T)^{\perp} = (C^{\perp})_T$, and $(C^{\perp})^T = (C_T)^{\perp}$.

(ii) If $|T| < d$, then $\dim C^T = k$ and $\dim(C^{\perp})_T = n - |T| - k$.