ECE/MATH 641: HOMEWORK 1, DUE SEP 29.

Please solve the following problems taken from Barg's notes.

1. Page 20: Show that the sum of two even-weighted vectors has even weight.

2. Page 25: Show that Hamming distance is a translation-invariant metric (if you don't know the definition of metric, just email me - translation-invariant means that $d(u + e, v + e) = d(u, v)$ for all vectors u, v, e).

3. Page 35: Suppose that the rank of $H(E)$ is less than $|E|$. Is there a codeword x with $\text{supp}(x) = E$? (Hint: first, look for counterexamples.)

4. Page 49: Show that the set of correctable errors $E(C)$ are the unique vectors of smallest weight in their cosets.

5. Page 61: Compute a generator matrix for the 4th generalized Hamming code.

6. Page 64: Is the all one vector $(11...1)$ a codeword of the mth generalized Hamming code for every m?