Math 821 – Combinatorics
Homework Assignment #3
27/2/2007
To be handed by 7/3/2007

Question 1: We used the following in our study of the Golay code. Prove it!

Let N be an 11 by 11 $(0, 1)$-matrix with the following properties:

(i) every row of N has six ones;

(ii) the inner product of any two distinct rows of N is at most 3.

Then N is the incidence matrix of a 2-$(11, 6, 3)$ design. Moreover, this design is unique (up to isomorphism).

Question 2: Show that a binary code of length 6 and minimum distance 3 has at most

(i) 9 codewords.

(ii) 8 codewords.

Question 3: The Coxeter graph is 3-arc transitive.

(i) Show that it is not 4-arc-transitive.

(ii) Show that it is s-arc-transitive for as large s as you manage.

Question 4: Let G be a graph with one vertex of degree 2 and all other of degree 3. Prove that its automorphism group has size 2^k for some integer k.