Math 502: Combinatorics II
Homework 7 - Due May 1

Instructions: Hand in a subset of the problems for which deleting any problem makes the total score less than 10. The maximum possible score on this homework is 10 points. See the syllabus for details.

Since we have moved to an online setting, please either type your solutions or take pictures of your handwritten solutions. Then email them to Maria.Gillespie@colostate.edu by May 1.

Problems

1. (1+) [2 points] Bob thinks of a number between 0 and 15. Alice wants to use yes/no questions to guess his number, but Bob is allowed to lie at most once. Show she cannot devise a strategy to correctly guess Bob's number using only 6 questions.

2. (2-) [3 points] Show that every Hamming code has minimum weight 3. Conclude that it is a 1-error-correcting code.

3. (2) [3 points] Cameron and Van Lint chapter 9 problem 1. (Note: a 'binary $(n, M, 2e + 1)$' code is a code C having M code words in $\mathbb{F}_2^n$ whose minimum distance is $2e + 1$.)

4. (2) [3 points] Cameron and Van Lint chapter 9 problem 2. (You may use a computer, but it's also not too hard to do it without using one.)

5. (2+) [4 points] Cameron and Van Lint chapter 9 problem 8.

6. (2+) [4 points] Cameron and Van Lint chapter 9 problem 9.

7. (2+) [4 points] Cameron and Van Lint chapter 10 problem 2.

8. (1+) [2 points] Cameron and Van Lint chapter 10 problem 3.