Pries: M460 - Information and Coding Theory, Spring 2019
Handout 2F: Computations

1. Modular arithmetic: $a \equiv b \bmod m$ mean that m divides $b-a$. For each problem below, find an integer $0 \leq c \leq 6$ such that

   (a) $c \equiv -17 \bmod 7$.

   (b) $3c \equiv 1 \bmod 7$.

   (c) $c^2 \equiv 2 \bmod 7$.

   (d) the powers $c, c^2, c^3, c^4, c^5, c^6$ are all different mod 7.

2. Would you rather play a game where you receive \$1000 if you:

   (a) (i) toss heads on a coin or (ii) roll 1 on a die?

   (b) (i) roll 1 on a die with 8 sides or (ii) roll a sum of 7 on two dice?

   (c) (i) choose 4 cards of the same number from a standard deck or
   (ii) choose 4 consecutive cards of the same suit from a standard deck?

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Homework 3:
Due Friday 2/8

Read Hall Sections 2.1-2.2 and Betten Section 1.2.

1. Hall problem 2.1.1 page 16
2. Hall problem 2.1.4 page 17
3. Betten problem E1.2.7
4. Betten problem E.1.2.8. If $C \subset (\mathbb{Z}/r\mathbb{Z})^n$ is a linear code, prove that the minimal distance d_{min} of C equals the minimal weight w_{min}. Hint: first show that $d_{min} \leq w_{min}$. Then given $x, y \in C$ such that $d(x, y) = d_{min}$, find $z \in C$ such that $wt(z) = d_{min}$.
5. Modular arithmetic: $a \equiv b \bmod m$ mean that m divides $b - a$. For each problem below, find an integer $0 \leq c \leq 10$ such that
   (a) $c \equiv -17 \bmod 11$.
   (b) $3c \equiv 1 \bmod 11$.
   (c) $c^2 \equiv 3 \bmod 11$.
   (d) the powers $c, c^2, \ldots, c^{10}$ are all different mod 11.
6. Extra credit E1.2.6.