

Homework 7, Due MON July 28, 2014

NOTE- THIS HW IS TWO PAGES LONG.

1. (0 points) What is your name? Write it clearly. STAPLE your HW.
2. (30 points) Consider the following error detection scheme: The content is 20 digits long: $a_{20}a_{19} \cdots a_1$. We also add the NUMBER:
 $a_{20} + \cdots + a_1$
(NOTE- we do not do a MOD)
 - (a) What is the most digits that $a_{20} + \cdots + a_1$ has?
 - (b) What is the probability that a single-digit-error will NOT be detected?
 - (c) What is the probability that a double-error will not be detected? (that is, two different digits are transmitted incorrectly).
 - (d) What is the probability that an adjacency-transposition error will NOT be detected?
3. (30 points) Zelda has a secret! She wants to share it with Alice, Bob, Carol, Donna, Edgar, Frank, and Gasarch (abbreviated A,B,C,D,E,F,G) so that the following hold:
 - ABCDE can determine the secret.
 - AF can determine the secret.
 - BF can determine the secret.
 - CF can determine the secret.
 - AG can determine the secret.
 - BG can determine the secret.
 - CG can determine the secret.
 - DG can determine the secret.
 - EG can determine the secret.
 - FG can determine the secret.
 - No proper subset of the above can determine the secret.

Describe a scheme that achieves this.

4. (30 points) You want to transmit 20 digits and you want to do error detection for catching ALL single-digit errors and ALL adjacency-transposition errors. You are allowed to have TWO check digits. How would you do this? Be very clear here- the students may have LOTS of different answers and we don't want to drive Liz crazy.