MCS 425: Codes and Cryptography (Spring 2020)
Homework 5

Due at 11:00am, Friday, May 1

Submission instructions:

- Email a single file to `yucheng2@uic.edu` (PDF format only).
- Name your file `<Lastname><Firstname>.pdf`, e.g., `ChengYu.pdf`.

Error correcting codes:

1) (2 poitns) Let C be a linear, binary $[n, k]$ code. Suppose the encoding matrix of C is

$$G = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 0 & 1 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 0 & 1 \end{pmatrix}$$

   a) Find n and k. What is the code rate of C?

   b) List all the codewords of C. What is the minimum distance of C?

   c) How to use C to send the message (101)?

   d) Write down the parity check matrix H of C.

   e) Suppose you receive the message (01101110). First use H to check if there is any error during transmission, then decode the original message.