1. (2 points) 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) What are the values of $n$ 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 would $C$ encode the message (101)?
d) Write down the decoding matrix $H$ of $C$.
e) Suppose we receive an (possibly corrupted) encoding (01101110). Use $H$ to check if there is any error during transmission and then decode the original message.