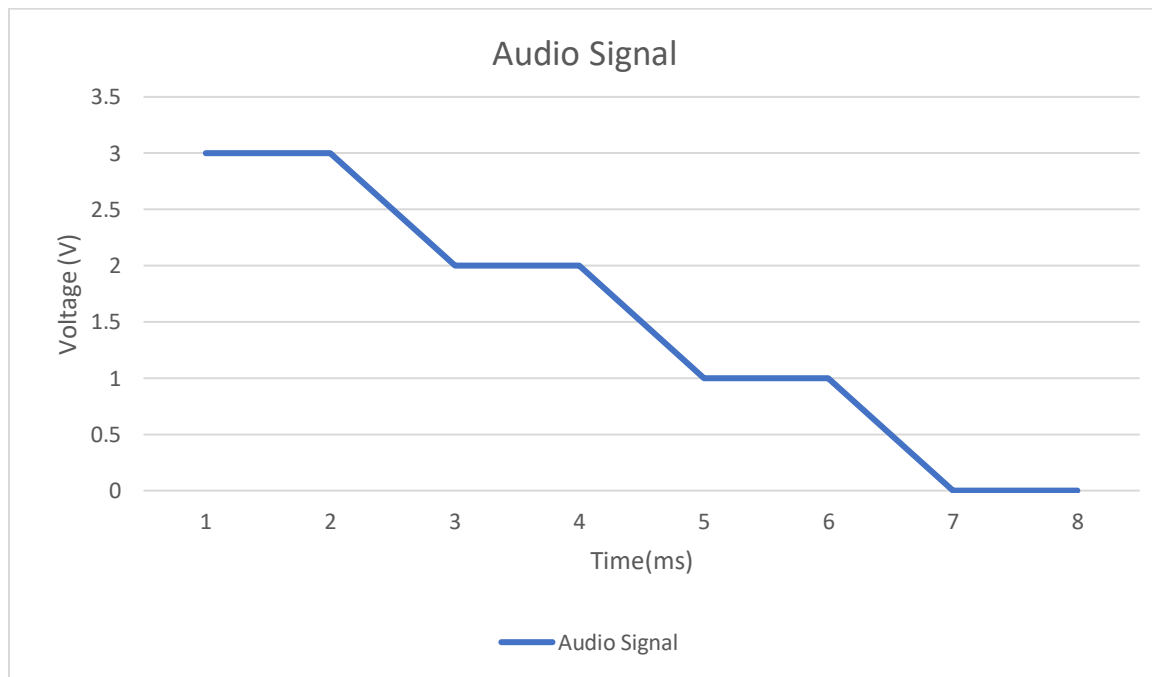# HOMEWORK 1

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1. Assume that 0 V is encoded as 00, 1 V as 01, 2 V as 10, and 3 V as 11. You are given a digital encoding of an audio signal as follows: 1111101001010000. Plot the re-created signal with time on the x-axis and voltage on the y-axis. Assume that each encoding's corresponding voltage should be output for 1 millisecond.

2. Convert the following binary numbers to decimal numbers:

a. $000011 = 1 \times 2^0 + 1 \times 2^1 + 0 \times 2^2 + 0 \times 2^3 + 0 \times 2^4 + 0 \times 2^5 = 3$

b. $1111 = 1 \times 2^0 + 1 \times 2^1 + 1 \times 2^2 + 1 \times 2^3 = 15$

c. $11110 = 0 \times 2^0 + 1 \times 2^1 + 1 \times 2^2 + 1 \times 2^3 + 1 \times 2^4 = 30$

d. $111100 = 0\text{x}2^0 + 0\text{x}2^1 + 1\text{x}2^2 + 1\text{x}2^3 + 1\text{x}2^4 + 1\text{x}2^5 = 60$

e. $0011010 = 0\text{x}2^0 + 1\text{x}2^1 + 0\text{x}2^2 + 1\text{x}2^3 + 1\text{x}2^4 + 0\text{x}2^5 + 0\text{x}2^6 = 26$

3. Convert the following binary numbers to hexadecimal:

a. 11001101 = 1100 1101 = CD

b. 10100101 = 1010 0101 = A5

c. 11110001 = 1111 0001 = F1

d. 1101101111100 = 1011 0111 1100 = B7C

4. Convert the following hexadecimal numbers to decimal:

a. $10 = 0\text{x}16^0 + 1\text{x}16^1 = 16$

b. $4E3 = 3\text{x}16^0 + 14\text{x}16^1 + 4\text{x}16^2 = 1251$

c. $FF0 = 0\text{x}16^0 + 15\text{x}16^1 + 15\text{x}16^2 = 4080$

d. $200 = 0\text{x}16^0 + 0\text{x}16^1 + 2\text{x}16^2 = 512$

5. Encode the following words into bits using the ASCII encoding table in Figure 1.9.

a. LET = 01001100 01000101 01010100

b. RESET! = 01010010 01000101 01010011 01000101 01010100 00100001

c. HELLO $1 = 01001000 01000101 01001100 01001100 01001111 00100000 00100100 00110001