

Jetic Gū

Columbia College

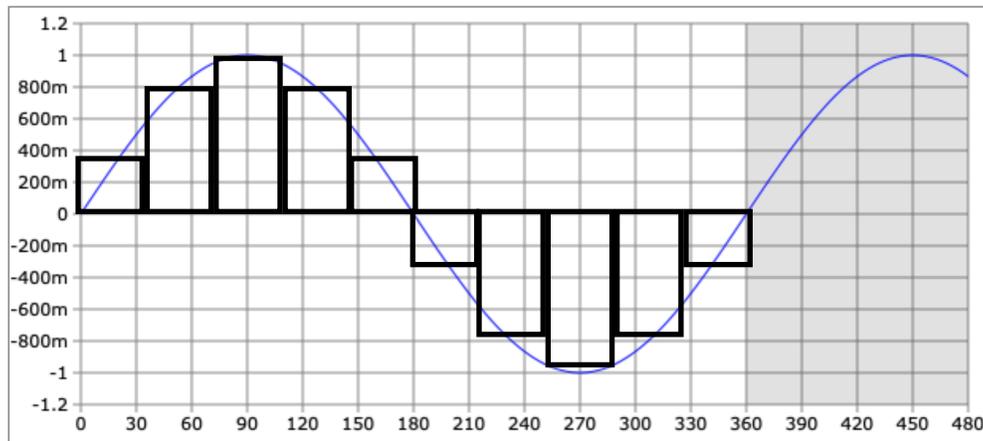
This assignment is due on 23 May 2021

Please remember to write your name and student number.

Please submit a single PDF for each assignment. Handwritten submissions and proprietary formats (e.g. Pages or MS Word) will not be accepted.

## Assignment 1 Answers

1. Plot a single cycle of Sin waveform at 440 Hz. Maximum strength should be 1000m, minimum -1000m.



- A. At a sample rate of 4400, write down the values of each sample in a cycle.

380, 800, 1000, 800, 380, -380, -800, -1000, -800, -380

- B. Convert all values to binary, octal, hexadecimal systems.

$$380 = (101111100)_2 = (574)_8 = 0x17C$$

$$800 = (1100100000)_2 = (1440)_8 = 0x320$$

$$1000 = (1111101000)_2 = (1750)_8 = 0x3E8$$

$$-380 = (-101111100)_2 = (-574)_8 = (-17C)_{16}$$

$$-800 = (-1100100000)_2 = (-1440)_8 = (-320)_{16}$$

$$-1000 = (-1111101000)_2 = (-1750)_8 = (-3E8)_{16}$$

- C. Assuming each sample is going to be represented a 2 byte binary code, what is the bitrate going to be?

$$\text{Sample rate } 4400, \text{ each sample } 2\text{bytes, total bitrate} = 4400 \times 2 = 8800 \text{ Bps (or } 70,400 \text{ bps)}$$

2. Perform a step by step multiplication of 54 and 7 in binary. Remember to write down all steps like we did in class, each step must be in binary.

$$\begin{array}{r}
 110110 \\
 \times \quad 111 \\
 \hline
 110110 \\
 110110 \\
 110110 \\
 \hline
 101111010
 \end{array}$$

3. What is the biggest number representable by the following bits of unsigned binary integers?

A. 11 bits; 28 bits

11bits:  $[0, 2^{11} - 1]$

28bits:  $[0, 2^{28} - 1]$

B. How about signed?

11bits:  $[-2^{10}, 2^{10} - 1]$

28bits:  $[-2^{27}, 2^{27} - 1]$

C. How about signed with parity code?

11bits:  $[-2^9, 2^9 - 1]$

28bits:  $[-2^{26}, 2^{26} - 1]$

D. What if with BCD?

11bits:  $[0, 799]$

28bits:  $[0, 99999999]$

4. A. Show the bit configuration that represents the decimal number 42 in binary, BCD, ASCII, ASCII with even parity.

BCD:  $(0100\ 0010)_{BCD}$

ASCII:  $(00110100\ 00110010)_{ASCII}$

ASCII:  $(\underline{1}00110100\ \underline{1}00110010)_{ASCII, \text{ even parity}}$

B. Do it for 75.

BCD:  $(0111\ 0101)_{BCD}$

ASCII:  $(00110111\ 00110101)_{ASCII}$

ASCII:  $(\underline{0}00110111\ \underline{0}00110101)_{ASCII, \text{ even parity}}$