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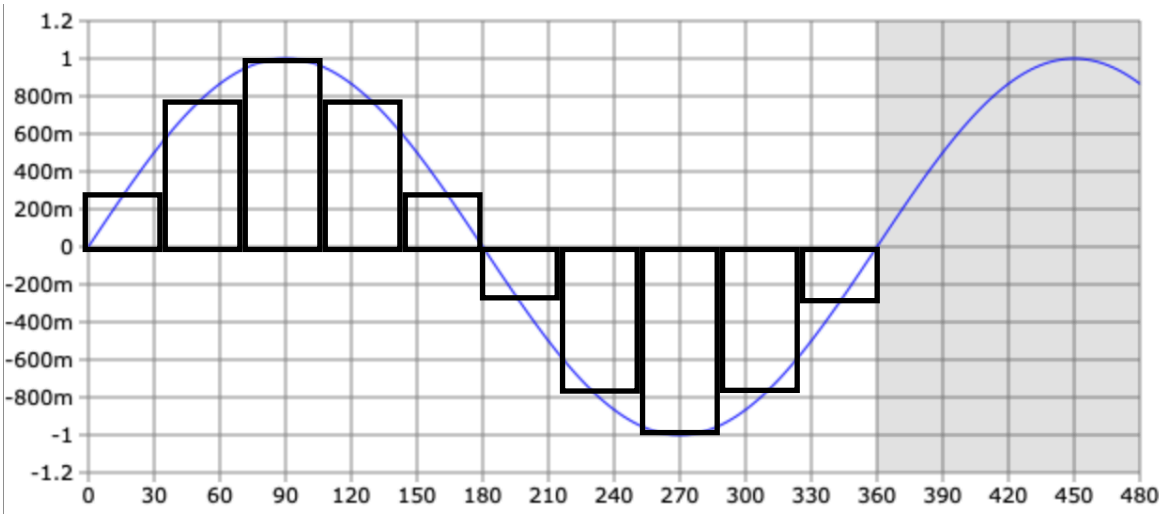
This assignment is due on 29 May. 2020

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 Solution

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.

      Number of samples per-cycle: 4400 / 440 = 10
      300, 800, 1000, 800, 300, -300, -800, -1000, -800, -300

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

      $300 = (1\ 0010\ 1100)_2 = (454)_8 = (12C)_{16}$; $-300 = (-1\ 0010\ 1100)_2 = (-454)_8 = (-12C)_{16}$;
      $800 = (11\ 0010\ 0000)_2 = (1440)_8 = (320)_{16}$; $-800 = (-11\ 0010\ 0000)_2 = (-1440)_8 = (-320)_{16}$;
      $1000 = (11\ 1110\ 1000)_2 = (1750)_8 = (3E8)_{16}$; $-1000 = (-11\ 1110\ 1000)_2 = (-1750)_8 = (-3E8)_{16}$;

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

      2 x 4400 = 8800 Bps = 8.8 KBps

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.

```
   110110
 x    111
 ------
   110110
  110110
```

```
  110110
101111010
```

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

   A. 11 bits; 28 bits

   $2^{11} - 1 = 2047; 2^{28} - 1$

   B. How about signed?

   $2^{10} - 1 = 1023; 2^{27} - 1$

   C. How about signed with parity code?

   $2^{9} - 1 = 511; 2^{26} - 1$

   D. What if with BCD?

   799; 9999999

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

   42
   = $(101010)_2$
   = $(0100\ 0010)_{BCD}$
   = $(0011\ 0100\ \ 0011\ 0010)_{ASCII}$
   = $(\underline{1}011\ 0100\ \ \underline{1}011\ 0010)_{ASCII+EvenParity}$

   B. Do it for 75.

   75
   = $(1001011)_2$
   = $(0111\ 0101)_{BCD}$
   = $(0011\ 0111\ \ 0011\ 0101)_{ASCII}$
   = $(\underline{1}011\ 0111\ \ \underline{0}011\ 0101)_{ASCII+EvenParity}$