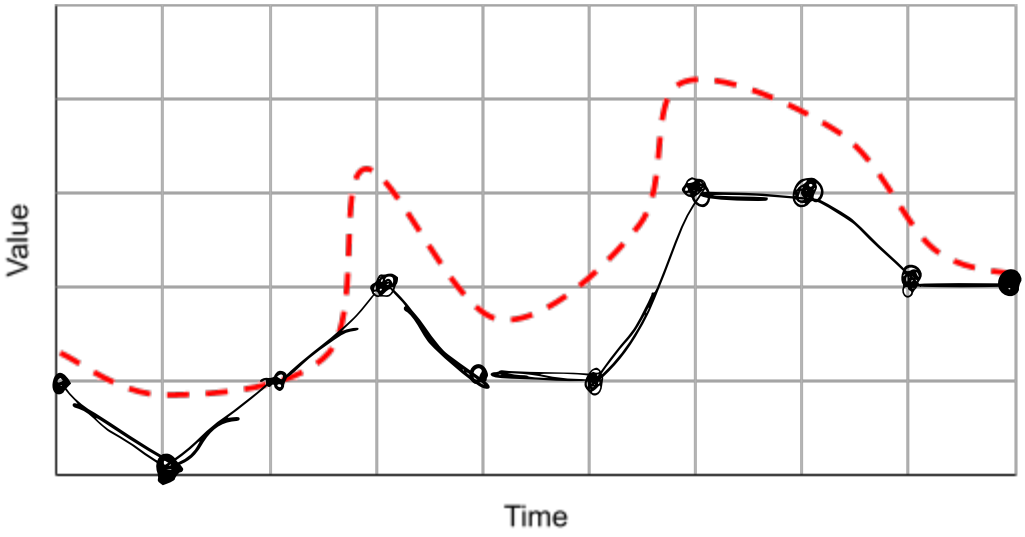
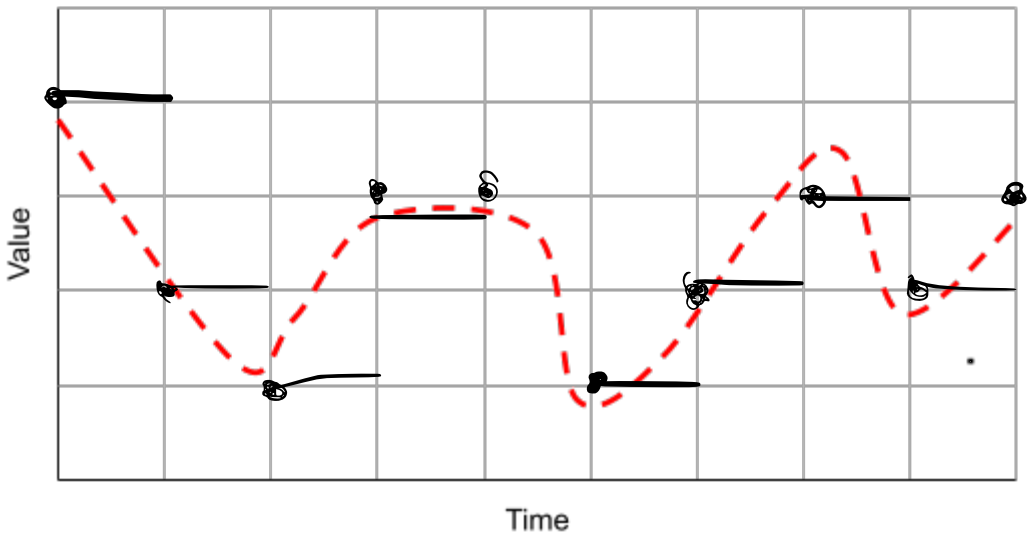
Name Anna Kurchenko

HW2: Sampling and unsigned positional numbers (CS220-01, 02)

1) In the diagrams below, the dotted line is the analog signal to be sampled. (a) On the top diagram, draw the approximated curve interpreted after digital sampling using **truncation** and **linear interpolation**. (b) On the bottom diagram, draw the approximated curve interpreted after digital sampling using **rounding** and **discrete interpolation**.



in part a these connecting lines are supposed to be linear <-



*I'm not exactly sure if for the discrete interpolation we connect the lines afterwards, but the example from lectures did not so I left it out just in case.

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2) What is the range of coefficients for numbers in Base 12?

0 : 12-1 = 0 :11 range

3) Show the math to find the range of 3 digit unsigned numbers in Base 7.

B^k -> 7^3 is total number of digits
= 343 digits
range = 0:343-1 = [0-342]

4) Show the math to find the range of 7 digit unsigned numbers in Base 3.

B^k -> 3^7 = 2187

range = [0 - 2187 - 1] = [0- 2186]

5) What are the four major issues that can occur as a side effect of the digital sampling of an analog signal?

(a) inaccurate values

(b) aliasing - can get lengthy misrepresentations of data

(c) miss anomalies

(d) might overemphasize anomolies

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6) (a) Write the complete coefficient-base-exponent form equation for the number 3261_7 and (b) calculate its decimal equivalent.

(a) 3 * 7^3 + 2 * 7^2 + 6* 7^1 + 1* 7^0

(b) 3* 343 + 2*49 + 6*7 +1 = 1170

7) (a) Write the complete coefficient-base-exponent form equation for the number $C2D_{14}$ and (b) calculate its decimal equivalent.

(a) C= 12, D=13; 12*16^2 + 2*16^1 + 13 * 16^0

(b) 12*256 + 2*16 + 13 = 3117

8) (a) Write the complete coefficient-base-exponent form equation for the number 10231_4 and (b) calculate its decimal equivalent.

(a) 1*4^4 + 0*4^3 + 2*4^2 + 3*4^1 + 1*4^0

(b) 256 + 32 + 12 + 1 = 301

9) Show your work to find the period of a 50 KHz digital waveform.

Googled how to do this since I don't think this was in the lectures.

T = 1/f where T = period and f is freq.

50 kHz = 50000 Hz

T = 1/50000 = 0.00002

10) In the image below, circle the rising edge transition, draw a square around the negative-going pulse, and underline the positive going pulse.