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Homework 4
Due Thursday, Oct. 20th, 2005

EECS 247
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Problem 1:

A 100mV peak-to-peak sinusoidal signal is applied to an ideal 14bit ADC. The maximum signal this ADC can handle is 2V peak-to-peak. Find the SNR for the digitized output signal.

Problem 2:

A 3-bit D/A converter were designed for an ideal LSB level of 100mV. The following output voltage levels were measured for the real D/A for the codes 000 through 111 respectively:

-0.01V 0.105V 0.195V 0.28V 0.37V 0.48V 0.6V 0.75V

- a- Find the offset & full-scale error in units of LSBs
- b- Find the end-point ideal & actual gain in LSB/code and compute the gain error in LSB/code
- c- Find the end point corrected codes and compute DNL & INL for all the codes
- d- What is the maximum DNL & INL?

Problem 3:

The vector shown below is a ramp histogram of the output codes obtained for a 4-bit ADC.

253 115 85 100 120 170 75 145 125 60 95 95 115 40 120 202

It is preferable to write a Matlab program to:

- a- Calculate the DNL and INL for all codes in LSBs.
- b- Find the peak positive and negative DNL and INL.
- c- Include a copy of your program.
- d- Is monotonicity guaranteed for this ADC?