

Name: _____

EE432 Fall 2011 Quiz 1

1. An A/D system has a sample rate of 11 kHz. A sinusoid is input for sampling that has a frequency of 3100 Hz. What is the frequency of the sinusoid that leaves the A/D? Did aliasing occur?
2. An A/D system has a sample rate of 20 kHz. A sinusoid is input for sampling that has a frequency of 9344 Hz. What is the frequency of the sinusoid that leaves the A/D? Did aliasing occur?
3. An A/D system has a sample rate of 14 kHz. A sinusoid is input for sampling that has a frequency of 13.5 kHz. What is the frequency of the sinusoid that leaves the A/D? Did aliasing occur?
4. An A/D system has a sample rate of 50 kHz. A sinusoid is input for sampling that has a frequency of 31 kHz. Will any sinusoid that comes out have a frequency in the Nyquist range? If not, why not? If so, why?
5. An analog signal has frequency content that ranges from 0 Hz to 2.33 kHz. What is the Nyquist rate?
6. If the signal from problem 5 is sampled at 1500 Hz, what is the Nyquist frequency and the Nyquist range?

7. In a generic DSP system (which included A/D and D/A), there are two low pass filters. What are they called and what is the function of each?

8. If an A/D has a fixed sample frequency of 22 kHz, what is the max frequency that can ever possibly come out of the A/D?

9. An analog signal has a voltage range of -22 V to +48 V. If it is sampled using a 6-bit quantizer, what is the resolution of the quantizer?

10. Design a 1-bit quantizer for an analog signal that has a voltage range of -3 V to +1 V. Ensure there are no “wasted” voltage levels (i.e., design for the actual voltage range of the analog signal). Fill in the following table:

Digital code (bits)	Decimal Value	Quantization Level (Voltage)

Bonus: What was the “Line of Death”, at least as far as Muammar Gaddafi was concerned?