

332:346 - Exam #1 Review Topics - Spring 2010

- Sampling theorem, $f_s \geq 2f_{\max}$.
- Effects of aliasing when $f_s < 2f_{\max}$. Rotating wheels. Determining reconstructed signal $x_a(t)$ from $x(t)$. Determining the aliased signal of a periodic signal.
- Practical and ideal antialiasing prefilters. Definitions and use of octave frequency units and attenuation in dB per octave. Determining the output of the antialiasing prefilter and the output of the reconstructor.
- Basic components of an overall DSP system and their function.
- A/D and D/A converters, successive approximation algorithm.
- Using $2^N = R/Q$ and $e_{\text{rms}} = Q/\sqrt{12}$, dynamic range of a quantizer in dB, 6 dB per bit rule.
- Stepping through the A/D successive approximation algorithm for the two's complement with rounding case (up to 6 bits.)
- Testing and using linearity and time invariance.
- Convolution by the convolution table.
- Convolution in the *direct form*, i.e., $y_n = \sum_m h_m x_{n-m}$. Direct-form table.
- Convolution in the *LTI form*, i.e., $y_n = \sum_k x_k h_{n-k}$. LTI table.
- Convolution of infinite sequences. Convolution of a finite sequence with an infinite one.
- Determining the range of the output time index and the summation limits in convolution.
- Input-on transients, input-off transients, and steady-state.
- Linear and circular buffer implementations of delays and FIR filters.
- Computational cost for implementing delays and FIR filters with linear or circular buffers.

Reading Materials:

All class material and all assigned material.

Textbook sections: 1.1-1.4.3, 2.1, 2.3, 2.4, 3.1-3.4, 4.1, 4.2

Practice Problems:

Textbook problems (assigned or not assigned) from above sections.

Examples in text.

Old exam problems (solutions are not available).