University of Notre Dame
Department of Electrical Engineering
EE 40471: Digital Signal Processing

February 8, 2007

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# Homework 3

**Due: February 16, 2007, 10:25am (end of class)**

**Reading:** Textbook sections 4.0-4.4 and 4.8 (pages 140-162, 185-201)

**Problem:**

1. A digital communication link carries binary-coded words representing samples of an input signal

$$x_c(t) = 3\,\cos(600\,\pi\,t) + 2\,\cos(1800\,\pi\,t).$$

   The link is operated at 10,000 bits/s and each input sample is quantized into 1024 different voltage levels.

   (a) What is the sampling frequency?

   (b) What is the Nyquist rate for the signal $x_c(t)$?

   (c) What are the frequencies for the resulting discrete-time signal $x(n)$?

   (d) What is the quantizer resolution $\Delta$?

**Problems from textbook**:

- Problem 4.21
- Problem 4.24
- Problem 4.25