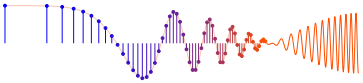

PROBLEM:

When a discrete-time signal is played out through a D/A converter and a speaker, we hear sounds over a well-defined frequency range. For this problem assume that the rate of the D/A converter is 10 kHz.

(a) A digital sinusoid is created using the formula: $y[n] = 10\cos(\pi n/8 + 3\pi/4)$ and then played out through the 10 kHz D/A. What analog frequency (in Hertz) is heard?

(b) A digital chirp signal is synthesized according to the following formula:

$$x[n] = \Re e\{e^{j\theta[n]}\} = \cos(7\pi \times 10^{-4} n^2) \qquad \text{for } n = 0, 1, 2, \ldots, 5000$$

Make a plot of the instantaneous *analog* frequency (in Hertz) versus time for the analog signal. Make sure that you determine the length of the signal in seconds. Does aliasing affect your answer?

McClellan, Schafer and Yoder, *Signal Processing First*, ISBN 0-13-065562-7.
Prentice Hall, Upper Saddle River, NJ 07458.