Homework due Monday Nov 13

1) Proakis and Manolakis 14.8
2) Proakis and Manolakis 14.9a
3) The problem below:

10.14. A speech signal is sampled with a sampling rate of 16,000 samples/s (16 kHz). A window of 20-ms duration is used in time-dependent Fourier analysis of the signal, as described in Section 10.3, with the window being advanced by 40 samples between computations of the DFT. Assume that the length of each DFT is $N = 2^v$.

(a) How many samples are there in each segment of speech selected by the window?
(b) What is the "frame rate" of the time-dependent Fourier analysis; i.e., how many DFT computations are done per second of input signal?

4) The problem below:

10.10. Figure P10.10 shows the spectrogram of a chirp signal of the form

$$x[n] = \sin\left(\omega_0 n + \frac{1}{2}\lambda n^2\right).$$

Note that the spectrogram is a representation of the magnitude of $X[n, k]$, as defined in Eq. (10.34), where the dark regions indicate large values of $|X[n, k]|$. Based on the figure, estimate ω_0 and λ.

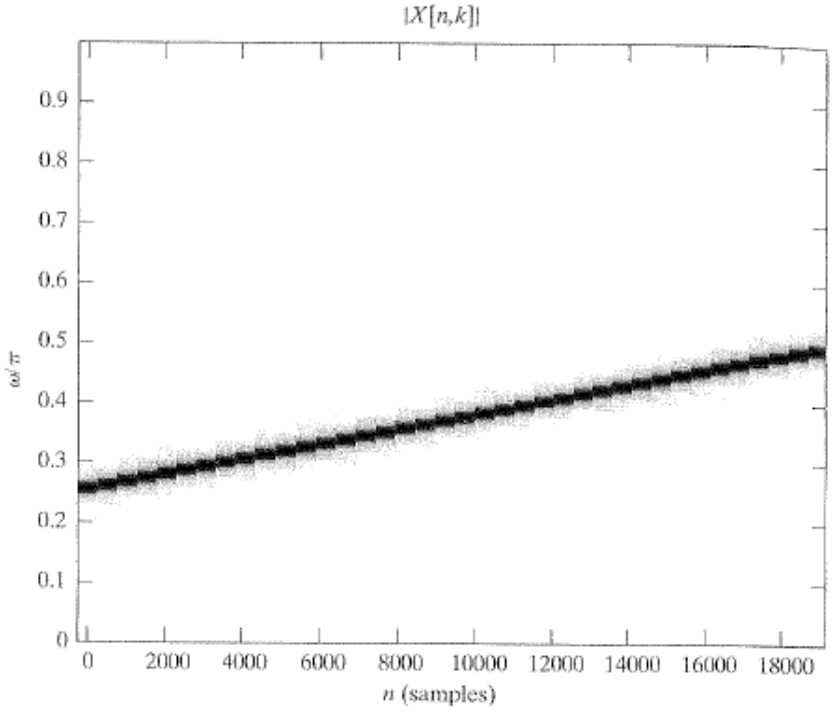

Figure P10.10