Homework #8
Due Date: Mar. 21, 2005

1. O&W 5.29

2. O&W 5.30 (a) and (c)

3. O&W 5.36 (a) and (b), parts (i-iii).

4. O&W 7.21

5. O&W 7.22

6. Consider the signal \( x(t) = \frac{1}{A} \text{sinc} \left( \frac{t}{A} \right) \), where \( A = 4 \).
   
   (a) For what values of \( T \) will this signal be adequately sampled.
   (b) Use Matlab’s fft function to calculate the Fourier transform of \( x(n) \) for \( n \) in the range \([−N/2 : N/2−1]\) where \( N = 64 \) and plot the magnitude and phase of \( X(\omega) \) from \( −\pi \) to \( \pi \). Do this for at least two values of \( T \), one where the signal is adequately sampled and one where it is not.

7. Consider the signal \( x(t) = \text{rect} \left( \frac{t}{A} \right) \), where \( A = 7 \).
   
   (a) Determine (analytically) the continuous FT of this signal and plot in Matlab.
   (b) Now, sample with sampling period \( T = 1 \). Determine the DTFT (analytically or numerically) of this signal and plot in Matlab.
   (c) Compare the continuous and discrete FT’s over the range \( −\pi \) to \( \pi \).
   (d) Take the result of part (a) and create \( X(\omega) + X(\omega − 2\pi) + X(\omega + 2\pi) \). Plot this signal over \( −\pi \) to \( \pi \) and compare to parts (a) and (b).