

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 π . 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 π .
 - (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 π and compare to parts (a) and (b).