HOMEWORK ASSIGNMENT 1
Reading: Text, Sections 2.1 - 2.3, Lathi, Chapter 2
Due Date: January 30, 2003 (in class)

1. Let a system be defined by \( y(t) = \frac{1}{2T} \int_{t-T}^{t+T} x(v) \, dv \). Is this system causal? What is its impulse response?

2. Determine whether the following signals are energy-type or power-type, and find the corresponding energy or power in the signal:
   (a) \( x(t) = u(t) \) (the unit step function)
   (b) \( x(t) = 2 \cos(2\pi t) + 3 \cos(4\pi t) \)
   (c) \( x(t) = \frac{1}{t} \)

3. Obtain the Fourier series expansion for the periodic function \( x(t) = 2 \cos(2f_0 t) + 3 \cos(4f_0 t) \).

4. Find the Fourier series expansion for \( x(t) = |\cos(\pi t/2)| \).

5. Determine the Fourier transform of the signal \( x(t) \) shown below which consists of three rectangular pulses. (Note: this is not a periodic function.)

![Diagram of rectangular pulses]

6. Use the duality property of the Fourier transform to find the Fourier transform of \( x(t) = \text{sinc}(Wt) \).