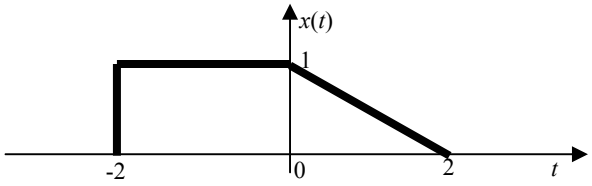
Homework #1

Due Date: Jan. 19, 2005

1. Consider the following 2 discrete domain signals:
   I. $x(n) = 3\sin(2\pi n/10)$
   II. $x(n) = \begin{cases} \sin(2\pi n/20) & 0 \le n \le 10 \\ 0 & otherwise \end{cases}$
   Do the following:
   a. Plot these signals in Matlab. Label all axes and put a title on the plot.
   b. Are these signals periodic and if so, determine the period.
   c. Are these power or energy signals? If power, determine P_∞, and if energy, determine E_∞ and P_∞.

2. Consider the following 2 continuous domain signals:
   I. $x(t) = 3\sin(2\pi t/10)$
   II. $x(t) = \begin{cases} \sin(2\pi t/20) & 0 \le t \le 10 \\ 0 & otherwise \end{cases}$
   Do the following:
   a. Plot these signals in Matlab using at least two different values of time increment, dt. Label all axes and put a title on the plot.
   b. Are these signals periodic and if so, determine the period.
   c. Are these power or energy signals? If power, determine P_∞, and if energy, determine E_∞ and P_∞. Determine these values both analytically and numerically. For numerical integration, use the approximation $\int f(t)dt \approx \sum_k f(k \cdot dt)dt$ and try at least two different values of *dt*.

3. O&W, problem 1.21 using the following figure.



4. O&W, problem 1.22.
5. O&W, problem 1.27 (examine all properties, except stability)
6. O&W, problem 1.34
7. Using the approximation $\delta_\Delta(t) = \frac{1}{\Delta} rect(\frac{t}{\Delta})$ as $\Delta \to 0$, show that $\delta(2t) = \frac{1}{2}\delta(t)$ and $u(t) = \int_{-\infty}^{t} \delta(\tau)d\tau$.
8. O&W, problem 1.44(a).