

ECE 360
HW #7
Due November 6, 2002

- Read 9.2 from Amardar
- Office Hours: M,T 10:00-11:30 am, F 12:00-1:30 pm.

1. 9.5 a, b, c, f, g, i

2. 9.11 a, d

3. Let $x(t)$ be a signal with Fourier transform $X(f)$. Define the signal

$$f(t) = \frac{d^2 x(t)}{dt^2}. \text{ Suppose that } X(f) = \begin{cases} 1 & -1 \leq f \leq 1 \\ 0 & \text{otherwise} \end{cases}. \text{ What is the value of}$$

$$\int_{-\infty}^{\infty} |f(t)|^2 dt ?$$

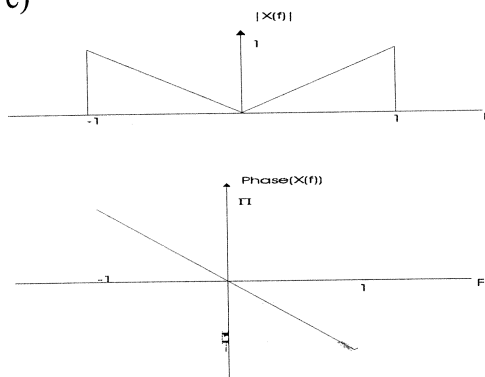
Hint: You can solve this without finding $f(t)$. Use Parseval's theorem.

4. For each of the following transforms, find the signal $x(t)$.

a) $X(f) = \sin(\pi f)$

b) $X(f) = \text{tri}(f - 0.5) + \text{tri}(f + 0.5)$

c)



Hint: Use tables and the duality property for part a) and b).

5. 9.13 d.

6. Determine which of the following signals have Fourier transforms that satisfy each of the following:

- a) Real part of $X(f)$ is zero.
- b) Imaginary part of $X(f)$ is zero.
- c) $\int_{-\infty}^{\infty} X(f) df = 0$
- d) There exists a real α such that $e^{j2\pi f\alpha} X(f)$ is real.

Hint: You can answer all of these questions by looking at the signals in the time domain. You don't need to compute any Fourier transform integrals.

