

**ECE 425 – Image Science and Engineering
Spring Semester 2000**

HOMEWORK #2

2/9/00

DUE: in-class February 15, 2000

1. Find the Fourier transforms of the following functions **using integration**:

a. $\text{rect}(x)$ (assume $f(x)=1$ for $|x|\leq 1/2$, i.e. $f(x)$ equals one at the discontinuities)

b. $\text{rect}(x)\cos(2\pi x)$

c. $\text{rect}(x)\cos(2\pi 4x)$

2. Find the Fourier transforms of the following functions using the functions and properties discussed in this class, **without using integration**:

a. $\text{rect}(x)\cos(2\pi x)$

b. $\text{rect}(x)\cos(2\pi 4x)$

c. $[\text{rect}(x)*\text{comb}(x/2)]/2$

3.a. Graph the amplitude of the spectra obtained in 2a-c. Use a computer plotting program, or do a reasonably accurate sketch on graph paper. Show the major frequency and amplitude values.

3.b. Graph the phase of the spectra obtained in 2a-c.

4.a. Find the coefficients of the Fourier series, and write the series, of the following function:

$[\text{rect}(x)*\text{comb}(x/2)]/2$

4.b. Compare the result in 4a with that in 2c.