

# EE 308: Communication Systems

## Homework 1

1. We have covered the following sections from Chapter 2 of the text: 2.1–2.6, 2.8, 2.9.
2. You are also expected to understand the solved examples in these sections of the text.
3. Solve the drill problems in the text as you read through the chapter.
4. Let  $y(t) = \int_{-\infty}^t x(\tau) d\tau$ . We can obtain the Fourier transform of  $y(t)$  using the differentiation property as follows.

$$\begin{aligned}x(t) &= \frac{dy(t)}{dt} \\X(f) &= j2\pi f Y(f) \\Y(f) &= \frac{1}{j2\pi f} X(f)\end{aligned}$$

which is different from the more general formula  $Y(f) = \frac{1}{2} \left[ \frac{X(f)}{j\pi f} + X(0)\delta(f) \right]$ . Explain.

5. End of chapter problems from Chapter 2: 2.19, 2.21, 2.25, 2.28, 2.31, 2.34, 2.38, and 2.42
6. Show that the Hilbert transform of  $e^{j\pi f_0 t}$  is  $-j [\text{sgn}(2\pi f_0 t)] e^{j2\pi f_0 t}$