

**ELEC 431**  
**Digital Signal Processing**  
**Homework 1**

Due Friday, January 24, 2002

**Note:** Homework, tests and solutions from previous offerings of this course are off limits, under the honor code.

**Relate the CTFT of  $x_c(t)$  to the DTFT of  $x[n]$ :**

Let  $x_c(t)$  be a CT signal and sample it at a rate of  $T$  samples/second. Recall that the CT sampled signal  $x_s(t) = \sum_n x_c(nT)\delta(t - nT) = \sum_n x[n]\delta(t - nT)$ . How is the DTFT of  $x[n]$

$$X(\omega) = \sum_n x[n]e^{-j\omega n}$$

related to the CTFT of  $x_c(t)$ ?

**HINT:** Consider the expression for the CTFT of  $x_s(t)$  and relate  $X(\omega)$  to  $X_s(\Omega)$  using the identification  $\omega \equiv \Omega T$ .