EELE 477
Digital Signal Processing

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DTFT (cont.)

Inverse DTFT

- Since the DTFT creates a unique representation of a sequence, it is generally invertible.

$$x[n] = \frac{1}{2\pi} \int_{-\pi}^{\pi} X\left(e^{j\hat{\omega}}\right) e^{j\hat{\omega}n} d\hat{\omega}$$

Inverse DTFT (cont.)

Example:

$$X\left(e^{j\hat{\omega}}\right) = e^{-j\hat{\omega}n_0} \leftrightarrow \delta[n - n_0]$$

Example:

$$X\left(e^{j\hat{\omega}}\right) = \begin{cases} 1 & |\hat{\omega}| \le \hat{\omega}_b \\ 0 & \hat{\omega}_b < |\hat{\omega}| \le \pi \end{cases} \leftrightarrow \frac{\sin(\hat{\omega}_b n)}{\pi n}$$