

# MAE 566

## System Identification

### Homework 6 (Due:3/27)

Determine the Fourier transform of the following time windows:

1. Rectangular

$$w_T(\tau) = \begin{cases} 1 & |\tau| \leq T \\ 0 & |\tau| > T \end{cases}$$

2. Bartlett

$$\left(1 - \frac{|\tau|}{T}\right) \cdot w_T(\tau)$$

3. Hanning

$$\frac{1}{2} \left(1 + \cos\left(\pi \frac{\tau}{T}\right)\right) \cdot w_T(\tau)$$

4. Hamming

$$\left(0.54 + 0.46 \cos\left(\pi \frac{\tau}{T}\right)\right) \cdot w_T(\tau)$$

Apply all the above windows to generate the DFT of a sinusoid with a frequency of 1 Hz for a time span of 0 to  $5\pi$  seconds. Present plots of the windowed DFTs.