**ECE 3522: Stochastic Processes in Signals and Systems**

# Computer Assignment (CA) No. 11: Autocorrelation And Power Spectral Density

Recall the autocorrelation function is defined as:



Compute and plot the autocorrelation function for the following signals, and then plot the power spectral density by computing the Fourier transform of the autocorrelation function.

(1) Gaussian white noise: N=100, M=20.

(2) An impulse function, : N = 100, M=20.

(3) A periodic impulse train with a period of 20 samples: N = 200, M = 60.

(4) A sinewave with a period of 20 samples: N = 200, M = 60.

(5) Repeat no. 4 for N = 14, 17, 20, 23, 26. Analyze the behavior that you observe and relate it to the period of the signal.

(6) The sum of (1) and (4) at an SNR of 10 dB (assume the sinewave is the signal and the Gaussian white noise is the noise): N = 200, M = 60. Explain what you observe.