

# MATLAB REPORT

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## Problem 3: Autocorrelation function of a sine wave

### THEORY:

The theoretical autocorrelation function is:

$$R_{xx}(\tau) = \frac{A^2}{2} \cos(\omega\tau)$$

For the ensemble average  $\Theta$  is a random variable and  $t$  is fixed, and for the time average  $\Theta$  is fixed and  $t$  is a time variable.

Autocorrelation function of a sinusoidal signal is given by:

$$x(t) = A \sin(\omega t + \Theta)$$

resulting from the ensemble average and time average.

**PLOT:** Sample and ensemble auto-correlations

