

## EC2010 - Computer Assignment #4

### ESTIMATING THE MEAN AND CORRELATION OF RANDOM PROCESSES

#### **Objective:**

To study and understand correlation for random processes.

#### **Procedure:**

#### **PART I**

The data sets S00.DAT, S01.DAT, S02.DAT and S03.DAT represent realizations of three different random signals. These files are available on the class web page under computer assignments.

(a) Plot each of the signals versus time. It is best to use 2 plots per page (use *subplot(211)* and *subplot(212)*) and orient the plot in landscape mode. Tell whether you think each random signal exhibits high correlation, low correlation, negative correlation, etc.

(b) Estimate the sample mean for each process; it should be close to zero.

(c) Estimate the sample correlation function for each process and plot it over the interval  $-100 \leq l \leq 100$ . Compare the correlation of each of the signals based on the estimated correlation function. How well does this compare to your guesses about correlation in part (a)? [Be honest! You won't lose points if your guesses in part (a) were incorrect.]

Give a 1 to 2 page summary of your results, answering the questions posed in the parts above and discussing what you have learned in this part of the assignment.

#### **PART II**

Generate some realizations of different types of random processes on your own. (Do at least two different random processes.) These random processes must necessarily be discrete-time random processes, but they can be discrete-valued or continuous-valued. For each random process that you generate, turn in a brief analysis (one page or less) describing the random process and showing what its theoretical mean and correlation function are. Now estimate the mean and correlation and/or covariance function from your data and show how it compares to the theoretical results. Provide a brief discussion.

#### **Programming note:**

Use the function *getdata* to retrieve the data as per the discussion in class.