
**Istanbul Technical University**

**Department of Civil Engineering**

**Hydraulics and Water Resources Engineering Graduate Program**

**Stochastic Modelling Techniques in Hydrology**

**Spring Semester**

## Assignment-3

There are some assumptions that we consider in order to apply linear regression analysis. These are:

a. There should be a linear relationship between the dependent and independent variables
b. The data should be normally distributed, i.e. the mean, mode and the median values should be the same or very close
c. The variance should be constant, and
d. Autocorrelation number should be close to zero showing that the variables are independent.

Keeping these assumptions in your mind:

1. Obtain data of two variables or time series of random variables and show if the above assumptions are fulfilled or not.
2. Develop a model relating the two variables using Moments, Least Square and Maximum Likelihood Methods.
3. For a linear relationship given as $y = ax + b \quad or \quad y_t = ay_{t-1} + b$, we can get n-1 numbers of $a$ and $b$ values from a data set having n observations.

    I. Follow the same technique and determine the different a and b values for the data set you obtained
    II. Predict the values of the dependent variable using maximum a and b, minimum a and b, mean a and b, mode a and b, and median a and b values
    III. Calculate statistical criteria of the Mean Square Error and Coefficient of Efficiency for all models.
    IV. Also use 45 degree diagonal line (1:1 line) to show the prediction results of all models.