

PROJECT 1
NON-LINEAR REGRESSION ANALYSIS
Due date is 24.02.2017 7 p.m. NO EXTENSION

1. Consider the following model;

$$y(t) = 1.5 + 2.0t + \epsilon(t); \quad t = 1, \dots, n$$

Here $\epsilon(t)$ is a sequence of *i.i.d.* normal random variable with mean zero and variance one.

- (a) Generate a sample using the above model and compute the least squares estimators of $a = 1.5$ and $b = 2.0$. Repeat the experiment 1000 times and compute the average biases and mean squared errors. Find the different (5-th, 10-th, 90-th and 95-th) percentile points of the least squares estimators. Perform this experiment for $n = 10, 20, 30, 50$
- (b) Just consider one particular data and analyze the data using R or MATLAB.
- (c) Repeat the experiment (a) when the variance of $\epsilon(t) = t^2$. Consider both the least squares estimators and the generalized least squares estimators.

2. Consider the following model;

$$y(t) = 1.5 + 2.0t + \epsilon(t); \quad t = 1, \dots, n$$

Here $\epsilon(t)$ is a sequence of *i.i.d.* Laplace random variable with mean zero and variance five.

- (a) Generate a sample using the above model and compute the maximum likelihood estimators of $a = 1.5$ and $b = 2.0$, when $n = 10$.
- (b) Solve the above problem by using any optimization routine available in R or MATLAB.
- (c) Find the MLE of b if a is assumed to be known of the same data set.