

# COMP 632: Assignment 1

Due on Tuesday, January 27 2015

*Presented to Dr. Doina Precup*

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## Question 1

## Question 2

When simplifying the maximum likelihood equation for a regression whose variables maintain a constant normal distribution we are able to obtain the sum-squared-error function. However, when the standard deviation varies from one variable to another this simplification is no longer achievable.

$$L(w) = \prod_{i=1}^m \frac{1}{\sqrt{2\pi\sigma_i^2}} e^{-\frac{1}{2} \left( \frac{y_i - h_w(x_i)}{\sigma_i} \right)^2} \quad (1)$$

$$\log L(w) = -\frac{1}{2}n \log(2\pi) - n \sum_{i=1}^m \log \sigma_i - \sum_{i=1}^m \left( \frac{(y_i - h_w(x_i))^2}{2\sigma_i^2} \right) \quad (2)$$

Similarly to when dealing with a constant distribution the maximization problem becomes one of minimizing the following equation.

$$n \sum_{i=1}^m \log \sigma_i + \sum_{i=1}^m \left( \frac{(y_i - h_w(x_i))^2}{2\sigma_i^2} \right) \quad (3)$$