

Department of Electrical and Computer Engineering
University of Massachusetts Lowell

EECE CDM Problem Set #3

1. Consider the system

$$t = w_0 + w_1 x + \varepsilon$$

where $w_0 = -0.3$ and $w_1 = 0.5$ and ε is drawn from the distribution $N_\varepsilon(0, 0.2^2)$.

- a. Given the training bases vectors $\underline{x} = [1, x_1]^T$ where x_1 is drawn from uniform distribution over the interval $(-1,1)$ find \underline{w} using the training outcome \underline{t} by the MLE approach. Compare your computed result to the exact result.
- b. Compute the MLE noise variance σ_t^2 which is equal to the variance of t . Compare your computed result to the variance of ε .
- c. Compute the condition number of the state-matrix ie `numpy.linalg.cond(A)`

2. For the system given in problem one compute the the values for \underline{w} using the MAP approach where relaxation $\beta = \sigma_t^2/q$ for $q = 1$ to 10. Compute the condition number of the state-matrix ie `numpy.linalg.cond(A)`