

Department of Electrical and Computer Engineering
University of Massachusetts Lowell

EECE CDM Problem Set #1

1. Consider the 2-D random vector \underline{x} with samples drawn from a Gaussian distribution $\underline{x}: N_{\underline{x}}(\underline{\mu}, \underline{\Sigma})$. The statistics of \underline{x} are: The mean

$$E(\underline{x}) = [1, 2]^T$$

the covariance

$$\underline{\Sigma} = \begin{bmatrix} \sigma_1^2 & r\sigma_1\sigma_2 \\ r\sigma_1\sigma_2 & \sigma_2^2 \end{bmatrix}$$

where $\sigma_1^2 = 1$, $\sigma_2^2 = 2$ and $r = 3/4$. Using a reasonable number of vector samples \underline{y} given that $\underline{y}: N_{\underline{y}}(0, I)$

- a. Generate the test set \underline{x} making use the Cholesky factorization.
- b. Evaluate the marginal pdfs f_{X_1} and f_{X_2} and compare your finding to the exact result.
- c. Provide a contour plot of the joint pdf $f_{\underline{X}}$ and compare the result to the exact result.