

## ECE 514 Project: Part II

Let  $X$  and  $Y$  be two jointly continuous random variables with the joint PDF:

$$f_{XY}(x, y) = \begin{cases} x + \frac{3}{2}y^2 & , 0 < x, y \leq 1 \\ 0 & , \text{Otherwise} \end{cases}$$

And let the random vector  $\mathbf{U}$  be defined as:

$$\mathbf{U} = \begin{pmatrix} X \\ Y \end{pmatrix}$$

1. Find the correlation and covariance matrices of  $\mathbf{U}$ .
2. You are now asked to generate a 1000-sample vector series,  $\mathbf{X}_s$  with the covariance matrix same as that of  $\mathbf{U}$ .
3. Estimate the  $Cov(\mathbf{X}_s)$ .
4. Compare  $Cov(\mathbf{U})$  and  $Cov(\mathbf{X}_s)$ . How would you proceed to improve the estimate  $Cov(\mathbf{X}_s)$ , if required.