

UNIVERSITY OF TORONTO
Department of Electrical & Computer Engineering
ECE1639F Fall 2008
Problem Set 1

Due: September 30, 2008

1. Problem 1.1
2. Problem 1.4
3. Problem 1.5
4. The standard bivariate Gaussian density is given by

$$f_{X,Y}(x, y) = \frac{1}{2\pi\sqrt{1-\rho^2}} \exp\left\{-\frac{x^2 - 2\rho xy + y^2}{2(1-\rho^2)}\right\}, \quad \text{where } -1 < \rho < 1$$

It is not difficult to verify that

$$f_X(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}$$

$$f_Y(y) = \frac{1}{\sqrt{2\pi}} e^{-\frac{y^2}{2}}$$

and $\text{cov}(X, Y) = E(XY) = \rho$. The parameter ρ is called the correlation coefficient. Specialize the results of Problem 1.5 to this case to determine $E(X|Y)$ and the conditional covariance $E[(X - E(X|Y))^2|Y]$.