Stat 134: Section 19

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Conceptual Review

a. Given $f_{X,Y}(x,y)$, how do you find the conditional density $f_Y(y|X = x)$?

b. What is the density of bivariate normal distribution (X,Y) with $Var(X) = Var(Y) = 1$, $Cov(X,Y) = \rho$?

Problem 1

From the bivariate normal density above, directly calculate $Y|X = x \sim \mathcal{N}(\rho x, 1 - \rho^2)$ without using the fact that $Y = \rho X + \sqrt{1 - \rho^2}Z$.

Problem 2

Let X and Y have the following density:

$$f(x,y) = \begin{cases} \lambda^3 x e^{-\lambda y} & \text{for } 0 < x < y \\ 0 & o.w. \end{cases}$$

(a) Find the density of Y and calculate $\mathbb{E}[Y]$.

(b) Compute $\mathbb{E}[X|Y=1]$.