

STAT 702/J702

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-Lecture 15-

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Today

- Continuous Joint Distributions (continued)




Example 1) $f(x, y) = 2, 0 < x < y < 1$
and 0 elsewhere

$$F(x_0, y_0) = \int_{-\infty}^{x_0} \int_{-\infty}^{y_0} f(x, y) dx dy$$




$$f_X(x) = \int_{-\infty}^{\infty} f(x, y) dy$$

$$f_Y(y) = \int_{-\infty}^{\infty} f(x, y) dx$$

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$$f_{Y|X}(y|x) = \frac{f_{X,Y}(x, y)}{f_X(x)}$$

$$f_{X|Y}(x|y) = \frac{f_{X,Y}(x, y)}{f_Y(y)}$$


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Example 2)

$$f(x, y) = \lambda^2 \exp(-y\lambda)$$


$$0 \leq x \leq y \leq 1, \lambda > 0$$

$$F(x_0, y_0) = \int_{-\infty}^{x_0} \int_{-\infty}^{y_0} f(x, y) dx dy$$

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$$f_X(x) = \int_{-\infty}^{\infty} f(x, y) dy$$

$$f_Y(y) = \int_{-\infty}^{\infty} f(x, y) dx$$

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$$f_{Y|X}(y|x) = \frac{f_{X,Y}(x,y)}{f_X(x)}$$


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Example 3)

$$f(x, y) = \frac{1}{2\pi\sigma_x\sigma_y\sqrt{1-\rho^2}} \exp \left\{ -\frac{1}{2(1-\rho^2)} \left[\frac{(x-\mu_x)^2}{\sigma_x^2} - \frac{2\rho(x-\mu_x)(y-\mu_y)}{\sigma_x\sigma_y} + \frac{(y-\mu_y)^2}{\sigma_y^2} \right] \right\},$$

$-\infty < \mu_x, \mu_y < \infty, \sigma_x, \sigma_y > 0, -1 < \rho < 1$

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$$F(x_0, y_0) = \int_{-\infty}^{x_0} \int_{-\infty}^{y_0} f(x, y) dx dy$$



$$f_X(x) = \int_{-\infty}^{\infty} f(x, y) dy$$

$$f_Y(y) = \int_{-\infty}^{\infty} f(x, y) dx$$



$$f_{Y|X}(y|x) = \frac{f_{X,Y}(x, y)}{f_X(x)}$$

$$f_{X|Y}(x|y) = \frac{f_{X,Y}(x, y)}{f_Y(y)}$$