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

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

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

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

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

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

Example 2)

$f(x, y) = \lambda^2 \exp(-y\lambda)$
$0 \le x \le y \le 1,\ \lambda>0$

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

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

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

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

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

Example 3)

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

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

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

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

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

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

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