

FIGURE 5.24 Contours of equal value of joint Gaussian pdf discussed in Example 5.45.

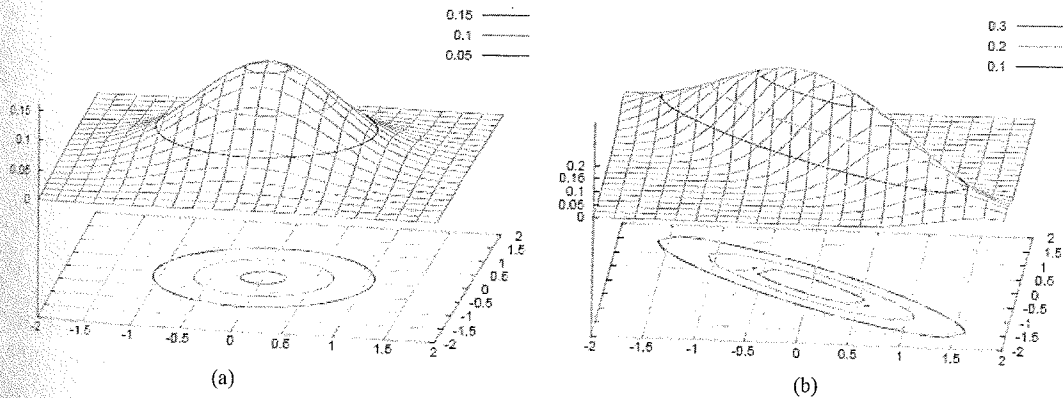


FIGURE 5.25 Jointly Gaussian pdf (a) $\rho = 0$ (b) $\rho = -0.9$.

Figure 5.26 shows the orientation of these elliptical contours for various values of σ_1 , σ_2 , and $\rho_{X,Y}$. When $\rho_{X,Y} = 0$, that is, when X and Y are independent, the equal-pdf contour is an ellipse with principal axes aligned with the x - and y -axes. When $\rho_{X,Y} \neq 0$, the major axis of the ellipse is oriented along the angle [Edwards and Penney, pp. 570–571]

$$\theta = \frac{1}{2} \arctan^{-1} \tan\left(\frac{2\rho_{X,Y}\sigma_1\sigma_2}{\sigma_1^2 - \sigma_2^2}\right). \quad (5.62)$$

Note that the angle is 45° when the variances are equal.

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sian if their joint pdf

$$\frac{x_2}{\sigma_2} + \left(\frac{y - m_2}{\sigma_2}\right)^2 \Bigg\}$$

(5.61a)

shape that depends on
in the figure, the pdf is
rent is constant:

= constant. (5.61b)