

SD372 - 2003

MICD examples

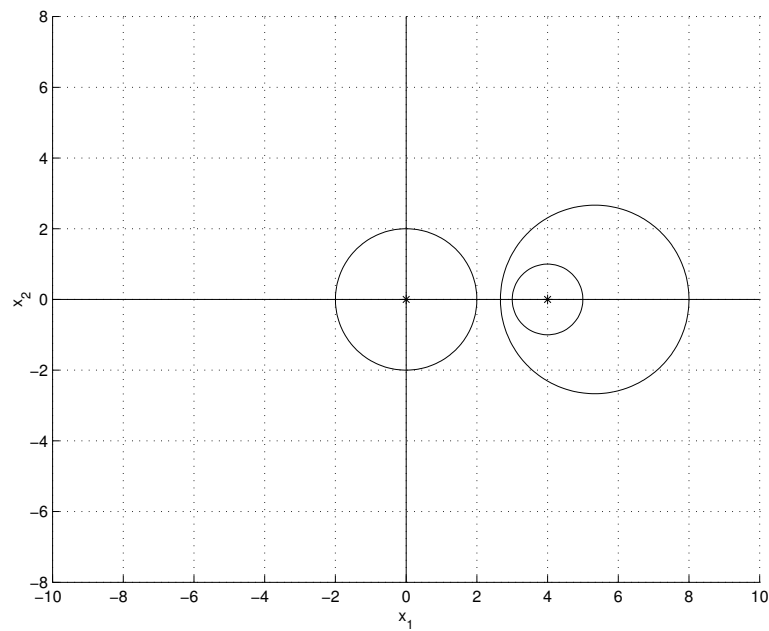
For each of the following two-class cases, give an equation for the boundary and sketch it along with the unit standard deviation contours. For all the cases, assume $\mu_1 = [0 \ 0]^T$ and $\mu_2 = [4 \ 0]^T$.

Case 1

$$S_1 = \begin{bmatrix} 4 & 0 \\ 0 & 4 \end{bmatrix} \quad S_2 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

Solution

$$-\frac{3}{4}x_1^2 - \frac{3}{4}x_2^2 + 8x_1 - 16 = 0$$

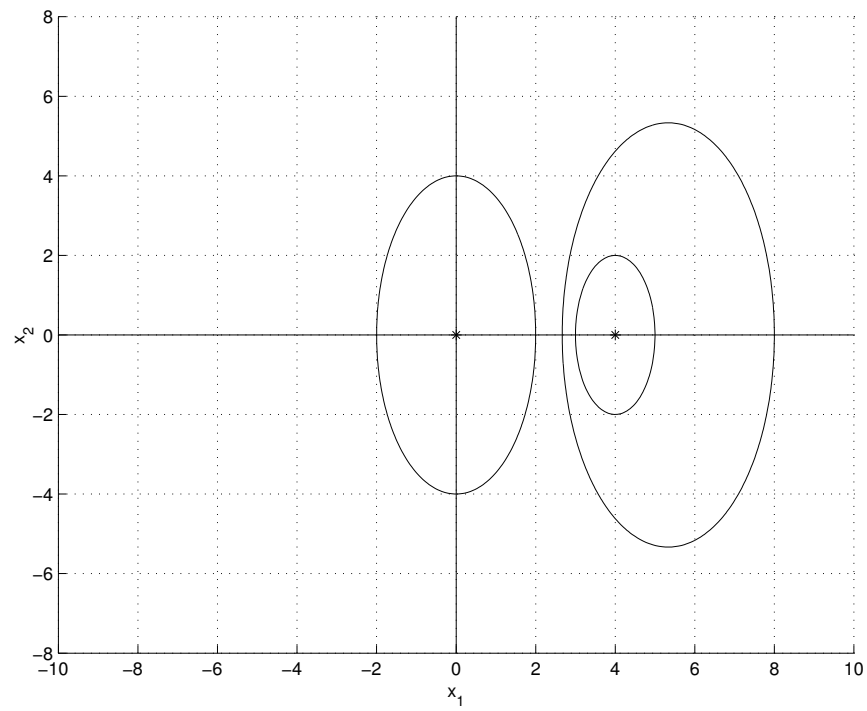


Case 2

$$S_1 = \begin{bmatrix} 4 & 0 \\ 0 & 16 \end{bmatrix} \quad S_2 = \begin{bmatrix} 1 & 0 \\ 0 & 4 \end{bmatrix}$$

Solution

$$-\frac{3}{4}x_1^2 - \frac{3}{16}x_2^2 + 8x_1 - 16 = 0$$

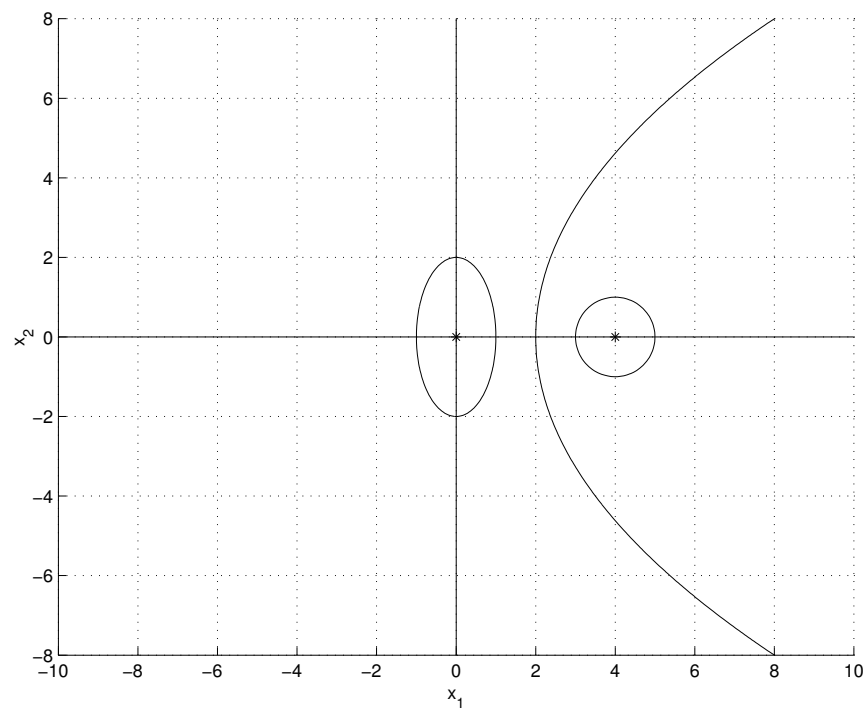


Case 3

$$S_1 = \begin{bmatrix} 1 & 0 \\ 0 & 4 \end{bmatrix} \quad S_2 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

Solution

$$-\frac{3}{4}x_2^2 + 8x_1 - 16 = 0$$



Case 4

$$S_1 = \begin{bmatrix} 1 & 0 \\ 0 & 4 \end{bmatrix} \quad S_2 = \begin{bmatrix} 4 & 0 \\ 0 & 1 \end{bmatrix}$$

Solution

$$\frac{3}{4}x_1^2 - \frac{3}{4}x_2^2 + 2x_1 - 4 = 0$$

