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解：(1) ∵ $\vec{w_1}=\begin{pmatrix}0&2&2&0\\0&0&2&2\end{pmatrix}$ $\vec{w_2}=\begin{pmatrix}4&6&6&4\\4&4&6&6\end{pmatrix}$

∵ $\vec{m_i}=E\{\vec{x_i}\}$ ∴ $\vec{m_1}=\begin{pmatrix}1\\1\end{pmatrix}$ $\vec{m_2}=\begin{pmatrix}5\\5\end{pmatrix}$

又 $\vec{C_i}=E\{(\vec{x_i}-\vec{m_i})(\vec{x_i}-\vec{m_i})^T\}$

$$\therefore \vec{C_1}=\frac{1}{4}\begin{pmatrix}-1&1&1&-1\\-1&-1&1&1\end{pmatrix}\begin{pmatrix}-1&-1\\1&-1\\1&1\\-1&1\end{pmatrix}=\begin{pmatrix}1&0\\0&1\end{pmatrix}$$

$$\vec{C_2}=\frac{1}{4}\begin{pmatrix}-1&1&1&-1\\-1&-1&1&1\end{pmatrix}\begin{pmatrix}-1&-1\\1&-1\\1&1\\-1&1\end{pmatrix}=\begin{pmatrix}1&0\\0&1\end{pmatrix}$$

$$\therefore \vec{C_1}=\vec{C_2}=\vec{C}$$

$$\therefore d_i(x)=\ln p(w_i)-\frac{1}{2}\ln|\vec{C_i}|-\frac{1}{2}\vec{x}^T\vec{C}^{-1}\vec{x}+\vec{m_i}^T\vec{C}^{-1}\vec{x}-\frac{1}{2}\vec{m_i}^T\vec{C}^{-1}\vec{m_i}$$

$$d_{12}(x)=d_1(x)-d_2(x)=\ln p(w_1)-\ln p(w_2)+(\vec{m_1}-\vec{m_2})^T C^{-1}\vec{x}-\frac{1}{2}\vec{m_1}^T\vec{C}^{-1}\vec{m_1}+\frac{1}{2}\vec{m_2}^T\vec{C}^{-1}\vec{m_2}=0$$

又 $p(w_1)=p(w_2)=\frac{1}{2}$

$$\therefore d_{12}(x)=(-4\ \ -4)\begin{pmatrix}1&0\\0&1\end{pmatrix}\begin{pmatrix}x_1\\x_2\end{pmatrix}-\frac{1}{2}(1\ \ 1)\begin{pmatrix}1&0\\0&1\end{pmatrix}\begin{pmatrix}1\\1\end{pmatrix}+\frac{1}{2}(5\ \ 5)\begin{pmatrix}1&0\\0&1\end{pmatrix}\begin{pmatrix}5\\5\end{pmatrix}=0$$

$$=-4x_1-4x_2+24=0$$

$$\therefore -x_1-x_2+6=0$$

(2)