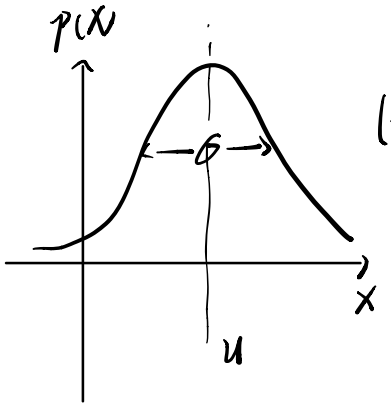
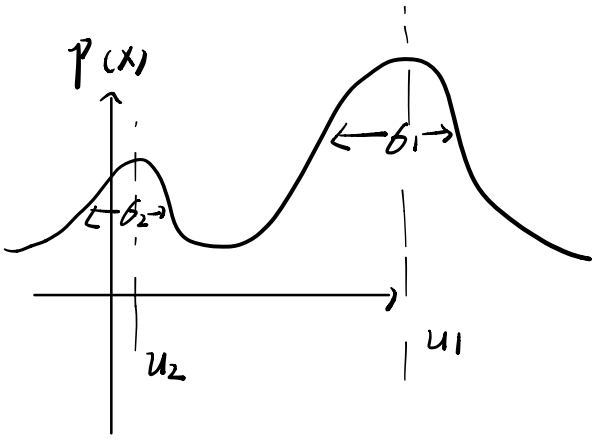
混合高斯模型（Gaussian Mixture Model）GMM

① $$\begin{cases} p(x|c) = \sum_{k=1}^{K} \pi_k N(x|u_k, \Sigma_k) \\ N(x|u_k, \Sigma_k) = \dfrac{1}{\sqrt{(2\pi)^d |\Sigma_k|}} \exp\left\{-\frac{1}{2}(x-u_k)^T \Sigma_k^{-1}(x-u_k)\right\} \\ \sum_{k=1}^{K} \pi_k = 1 \end{cases}$$

dx1 dx1 dxd



（单高斯）



② $$E\left(\{\pi_k, u_k, \Sigma_k \mid k=1\sim K\}\right) = \sum_{i=1}^{N} \ln p(x_i|c)$$

$$= \sum_{i=1}^{N} \ln\left[\sum_{k=1}^{N} \pi_k \cdot \frac{1}{\sqrt{(2\pi)^d |\Sigma_k|}} \exp\left(-\frac{1}{2}(x_i-u_k)^T \Sigma_k^{-1}(x_i-u_k)\right)\right]$$