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$x_1, \dots, x_n$; $x_i \sim \sum_{j=1}^{K} \pi_j N(m, \sigma_j^2)$; $m \sim N(m_0, \sigma_0^2)$, $\frac{1}{\sigma_j^2} \sim \Gamma(\alpha_j, \beta_j)$

а) $p(X, m, \sigma^2 | \alpha, \beta, m_0, \sigma_0^2, \pi) = p(X | m, \sigma^2, \pi)\, p(m | m_0, \sigma_0^2)\, p(\sigma^2 | \alpha, \beta) =$

$= \prod_{i=1}^{n} \left(\sum_{j=1}^{K} \pi_j N(x_i | m, \sigma_j^2) \right) N(m | m_0, \sigma_0^2) \prod_{j=1}^{K} \Gamma\left(\frac{1}{\sigma_j^2} | \alpha_j, \beta_j \right)$

б) $p(m, \sigma^2 | X, \alpha, \beta, m_0, \sigma_0^2, \pi) = \frac{p(X, m, \sigma^2 | \alpha, \beta, m_0, \sigma_0^2)}{p(X | \alpha, \beta, m_0, \sigma_0^2)} \propto$

$p(X, m, \sigma^2 | \alpha, \beta, m_0, \sigma_0^2, \pi)$ – пункт а)

в) $p(X, m, \sigma^2, Z | \alpha, \beta, m_0, \sigma_0^2, \pi) = \prod_{i=1}^{n} \left(\prod_{j=1}^{K} \pi_j N(x_i | m, \sigma_j^2) \right)^{z_{ij}} \cdot$

$\prod_{j=1}^{K} \Gamma\left(\frac{1}{\sigma_j^2} | \alpha_j, \beta_j \right) N(m | m_0, \sigma_0^2)$