

$$\sum_{ij} P(\delta_{ij} = 1 | \mathbf{x}, \theta^{(n)}) [\log \pi_j + \log P(\mathbf{x}_i | \mu_j, \Sigma)] =$$

$$\sum_{ij} P(\delta_{ij} = 1 | \mathbf{x}, \theta^{(n)}) \left[\log \pi_j - \frac{-(\mathbf{x}_i - \mu_j) \Sigma^{-1} (\mathbf{x}_i - \mu_j)}{2} - \log Z \right]$$