Cameron Wonchoba
wonch002
5239321

Problem 1a:

model 2:

likelihood function $= -\frac{1}{2}(x-m_i)^T S^{-1}(x-m_i)$

MLE estimates are...

$$\boxed{m_i = \frac{\sum_t r_i^t x^t}{\sum_t r_i^t}}$$

$$\boxed{S = \frac{\sum_t r_i^t (x^t - m_i)(x^t - m_i)^T}{\sum_t r_i^t}}$$

model 3

likelihood function $= -\log(2\pi) - \frac{1}{2}\log(\det(S)) - \frac{1}{2}(x-\mu)^T S^{-1}(x-\mu)$

$$m_i = \frac{\sum_t r_i^t x^t}{\sum_t r_i^t}$$

$$S = \frac{\sum_t r_i^t (x^t - m_i)(x^t - m_i)^T}{\sum_t r_i^t}$$

To derive diagonal matrix, take avg of diagonal in $S$...
$= \alpha$ ... Then

$S = I\alpha$