2 a. $P(G=0 \mid X=x) = P(G=1 \mid X=x)$

$$\cancel{\pi} f_0(x) = \cancel{\pi} f_1(x)$$

$$f_0(x) = f_1(x)$$

$$\sum_{i=1}^{m} \frac{1}{m}\cancel{\left(\frac{1}{(2\pi)^{p/2}\,|\Sigma|^{1/2}}\right)} e^{-\frac{1}{2}(x-\mu_i)^T \Sigma^{-1}(x-\mu_i)} = \sum_{i=1}^{m} \frac{1}{m}\cancel{\left(\frac{1}{(2\pi)^{p/2}\,|\Sigma|^{1/2}}\right)} e^{-\frac{1}{2}(x-v_i)^T \Sigma^{-1}(x-v_i)}$$

$$\sum_{i=1}^{m} \exp\left[\frac{-1}{2}(x-\mu_i)^T \Sigma^{-1}(x-\mu_i)\right] = \sum_{i=1}^{m} \exp\left[\frac{-1}{2}(x-v_i)^T \Sigma^{-1}(x-v_i)\right]$$

$$\begin{bmatrix} x_1-\mu_1 & \cdots & x_p-\mu_p \end{bmatrix} \underbrace{\begin{bmatrix} \frac{1}{s} & & 0 \\ & \ddots & \\ 0 & & \frac{1}{s} \end{bmatrix}}_{p \times p} \begin{bmatrix} x_1-\mu_1 \\ \vdots \\ x_p-\mu_p \end{bmatrix} = \sum_{j=1}^{p} \frac{1}{s}(x_j-\mu_j)^2$$

by symmetry same thing for vs

j^{th} parameter of i^{th} μ

$$\sum_{i=1}^{m} \exp\left[\frac{-1}{2s}\sum_{j=1}^{p}(x_j-\mu_{ij})^2\right] = \sum_{i=1}^{m} \exp\left[\frac{-1}{2s}\sum_{j=1}^{p}(x_j-v_{ij})^2\right]$$

$$0 = \sum_{i=1}^{m}\left(\exp\left[\frac{-1}{2s}\sum_{j=1}^{p}(x_j-v_{ij})^2\right] - \exp\left[\frac{-1}{2s}\sum_{j=1}^{p}(x_j-\mu_{ij})^2\right]\right)$$