Submission for Apoorv Walia and Marco Lagos

3.2 $\quad y \sim \text{Bernoulli}(\gamma)$

$$x_j / y=1 \sim N(\mu_j^1, \sigma_j^2)$$

$$x_j / y=0 \sim N(\mu_j^0, \sigma_j^2)$$

$$P(y=1/x) = \frac{P(x/y=1)P(y=1)}{P(x)}$$

$$= \frac{P(x/y=1)\,P(y=1)}{P(x/y=0)P(y=0) + P(x/y=1)\,P(y=1)}$$

$$= \frac{\gamma \prod_{j=1}^{d} \frac{1}{\sqrt{2\pi\sigma_j}}\, e^{-\frac{(x_j-\mu_j^1)^2}{\sigma_j^2}}}{(1-\gamma)\prod_{j=1}^{d} \frac{1}{\sqrt{2\pi\sigma_j}}\, e^{-\frac{(x_j-\mu_j^0)^2}{\sigma_j^2}} + \gamma \prod_{j=1}^{d} \frac{1}{\sqrt{2\pi\sigma_j}}\, e^{-\frac{(x_j-\mu_j^1)^2}{\sigma_j^2}}}$$

$$P(y=0/x) = \frac{P(x/y=0)P(y=0)}{P(x)}$$

$$= \frac{P(x/y=0)P(y=0)}{P(x/y=0)P(y=0) + P(x/y=1)P(y=1)}$$

$$= \frac{\gamma \prod_{j=1}^{d} \frac{1}{\sqrt{2\pi\sigma_j}}\, e^{-\frac{(x_j-\mu_j^0)^2}{\sigma_j^2}}}{(1-\gamma)\prod_{j=1}^{d} \frac{1}{\sqrt{2\pi\sigma_j}}\, e^{-\frac{(x_j-\mu_j^0)^2}{\sigma_j^2}} + \gamma \prod_{j=1}^{d} \frac{1}{\sqrt{2\pi\sigma_j}}\, e^{-\frac{(x_j-\mu_j^1)^2}{\sigma_j^2}}}$$