Q2.1

$$P(y|x) = \frac{1}{1 + e^{-\theta^T x}}$$ 证毕

Q2.2

$$P(y=1|x) = \frac{P(x|y=1)\,P(y=1)}{P(x|y=1)P(y=1) + P(x|y=0)P(y=0)} \quad \text{(Bayes)}$$

$P(y^{(i)}) = \gamma^{(y^{(i)})}(1-\gamma)^{(1-y^{(i)})} \Rightarrow P(y=0) = 1-\gamma;\ P(y=1) = \gamma.$

$P(x_j|y=0) = N(\mu_j^0, \sigma_j^2)$, $P(x_j|y=1) = N(\mu_j^1, \sigma_j^2)$

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

$$= \frac{1}{1 + e^{\ln \frac{P(x|y=0)P(y=0)}{P(x|y=1)P(y=1)}}}$$

$$= \frac{1}{1 + e^{\left(\ln \frac{P(y=0)}{P(y=1)} + \ln \frac{P(x|y=0)}{P(x|y=1)}\right)}}$$

$$= \frac{1}{1 + e^{\left(\ln \frac{1-\gamma}{\gamma} + \ln \frac{P(x|y=0)}{P(x|y=1)}\right)}} \quad \text{(A)}$$