1.c) Question 7

$$P_i(x) = \frac{\pi_i \frac{1}{\sqrt{2\pi}\sigma} e^{\left(\frac{-1}{2\sigma^2}(x-\mu_i)^2\right)}}{\sum_{l=1}^{i} \pi_l \frac{1}{\sqrt{2\pi}\sigma} e^{\left(\frac{-1}{2\sigma^2}(x-\mu_i)^2\right)}}$$

Given

$\pi_{yes} = 0.8 \quad \pi_{NO} = 0.2 \quad \mu_{yes} = 10$

$\mu_{NO} = 0 \quad \hat{\sigma}^2 = 36$

$f_{yes}(x) = N(\mu = 10, \sigma^2 = 36) = 0.04$

$f_{NO}(x) = N(\mu = 0, \sigma^2 = 36) = 0.05$

$$\pi_{yes}(4) = \frac{0.8 \times 0.04}{0.8 \times 0.04 + 0.2 \times 0.05} = \frac{0.032}{0.042}$$

$$= 0.761$$