4.7.7.

Density function for a normal random variable is :

$$f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} \cdot e^{\frac{-1}{2\sigma^2} \cdot (x-\mu)^2} \quad \text{—— (1)}$$

using (1), probability for a given (x, k) pair will be :

$$P_k(X) = \frac{\dfrac{\pi_k}{\sqrt{2\pi\sigma^2}} \cdot \exp\left(-\dfrac{1}{2\sigma_k^2} \cdot (x-\mu_k)^2\right)}{\displaystyle\sum_{l=1}^{K} \frac{\pi_l}{\sqrt{2\pi\sigma_l}} \cdot \exp\left(\frac{-1}{2\sigma_l^2}(x-\mu_l)^2\right)} \quad \text{—— (2)}$$

Plugging in values, where issuing dividend is classified as 1 & not issuing a dividend as 0 .

2/10

$\pi_K = \pi_{yes} = 0.8$ $\qquad$ $\mu_K = \mu_{yes} = 10$

$\pi_L = \pi_{no} = 0.2$ $\qquad$ $\mu_{no} = 0 = \mu_L$

$X = 4$ $\qquad$ $\mu^2 = 36$

$$P(y = yes \mid x = 4) \; \cancel{P(4)} = \frac{0.8 \cdot \exp\left[-\frac{1}{2 \cdot 36}(4-10)^2\right]}{0.8 \cdot \exp\left[-\frac{1}{2 \cdot 36}(4-10)^2\right] + 0.2 \exp\left[-1/_{2 \cdot 36} \cdot (4-0)^2\right]}$$

$$= \frac{0.8 \cdot \exp\left[-\frac{36}{2 \cdot 36}\right]}{0.8 \exp\left[\frac{-36}{2 \cdot 36}\right] + 0.2 \exp\left[\frac{-16}{2 \cdot 36}\right]}$$

$$= \frac{0.8 \exp\left[-\frac{1}{2}\right]}{0.8 \exp\left[-1/2\right] + 0.2 \exp\left[-2/9\right]}$$

$$= 0.7519$$

$$\therefore P(y = yes \mid \cancel{P(4)}\; x = 4) = \underline{\underline{0.752}}$$