Yes : $\bar{x} = 10$, $\hat{\sigma}^2 = 36$ $\quad x \sim N$.

No : $\bar{x} = 0$, $\hat{\sigma}^2 = 36$ $\quad x = 4 \Rightarrow p(Yes \mid X=4)$

$$p(Yes \mid X=4) = \frac{p(Yes, X=4)}{p(X=4)} = \frac{p(X=4 \mid Yes) \cdot p(Yes)}{p(X=4)}$$

$$p(X=4) = p(X=4 \mid Yes)\, p(Yes) + p(X=4 \mid No)\, p(No)$$

※ $\pi_1 = \pi_2 = 1/2$ (사전확률 정보가 주어지지 않은 경우) (가정) **

* 정규분포 밀도함수

$$f(x \mid \mu, \sigma^2) = \frac{1}{\sqrt{2\pi} \cdot \sigma} \exp\left(-\frac{(x-\mu)^2}{2\sigma^2}\right)$$

$$p(X=4 \mid Yes) = \frac{1}{\sqrt{2\pi} \cdot 6} \exp\left(-\frac{(4-10)^2}{2 \cdot 36}\right)$$

$$p(X=4 \mid No) = \frac{1}{\sqrt{2\pi} \cdot 6} \exp\left\{-\frac{(4-0)^2}{2 \cdot 36}\right\} \qquad \frac{16}{2 \cdot 36} = \frac{2}{9}$$

$$\Rightarrow p(Yes \mid X=4) = \frac{\frac{1}{\sqrt{2\pi} \cdot 6} \exp\left(-\frac{1}{2}\right) \times \frac{1}{2}}{\frac{1}{\sqrt{2\pi} \cdot 6} \exp\left(-\frac{1}{2}\right) \cdot \frac{1}{2} + \frac{1}{\sqrt{2\pi} \cdot 6} \exp\left\{-\frac{2}{9}\right\} \cdot \frac{1}{2}}$$

$$= \frac{e^{-1/2}}{e^{-1/2} + e^{-2/9}} = 0.431.$$