2.59

$$p(x|\sigma) = \frac{1}{\sigma} f\left(\frac{x}{\sigma}\right)$$

$$\int_{-\infty}^{\infty} p(x|\sigma) = \int_{-\infty}^{\infty} \frac{1}{\sigma} f\left(\frac{x}{\sigma}\right) dx$$

Substituting $y = \frac{x}{\sigma}$,

$$= \int_{-\infty}^{\infty} \frac{1}{\sigma} f(y)\, dy \left(\frac{dx}{dy}\right)$$

$$= \int_{-\infty}^{\infty} \frac{1}{\sigma} f(y)\, dy\ (\sigma)$$

$$= \int_{-\infty}^{\infty} \frac{1}{\sigma} f(y)\, dy\ (\sigma)$$

$$= \int_{-\infty}^{\infty} f(y)\, dy$$

$$= 1$$

Therefore, the density (2.236) will be correctly normalized, provided f(x) is correctly normalized.