Assignment 20

William Wallius

October 2020

20-1

(a)

$$\begin{aligned}\int_{-\infty}^{0} 0\,dx + \int_{0}^{\infty} 2e^{-2x}\,dx & \\ &= 0 + -e^{-2x}\big|_{x=0}^{x=\infty} \\ &= 0 - (-1) \\ &= 1\end{aligned}$$

(b)

$$\begin{aligned}\int_{0}^{1} 2e^{-2x}\,dx & \\ &= -e^{-2x}\big|_{x=0}^{x=1} \\ &= -e^{-2} - (-1) \\ &= 1 - e^{-2}\end{aligned}$$

(c)

$$\begin{aligned}\int_{-\infty}^{0} 0\,dx + \int_{0}^{\infty} x2e^{-2x}\,dx & \\ &= 0 - e^{-2x}x - \frac{1}{2}e^{-2x}\big|_{x=0}^{x=\infty} \\ &= 0 - \left(-\frac{1}{2}\right) \\ &= \frac{1}{2}\end{aligned}$$

(d)

$$\int_{-\infty}^{\infty} \left(-\frac{1}{2}\right)^2 * p(x)\, dx$$

$$= \int_{-\infty}^{0} \left(x - \frac{1}{2}\right)^2 * 0\, dx + \int_{0}^{\infty} \left(x - \frac{1}{2}\right)^2 * 2e^{-2x}\, dx$$

$$= -e^{-2x}x^2 - \frac{1}{4}e^{-2x}\Big|_{x=0}^{x=\infty}$$

$$= 0 - \left(-\frac{1}{4}\right)$$

$$= \frac{1}{4}$$