4.19  Missing part. Find $X(0)$

$$x(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} X(\omega) e^{j\omega t} \, d\omega$$

$$x(0) = \frac{1}{2\pi} \int_{-\infty}^{0} X(\omega) \, d\omega$$

a) \[
\begin{array}{c}
\begin{aligned}
X(\omega) &
\end{aligned}
\end{array}
\]

\[x(0) = 0\]

b) \[X(\omega) = 2 e^{-\frac{\pi}{4} \omega}, \quad -2 < \omega < 2\]

\[x(0) = \frac{1}{2\pi} \int_{-2}^{2} 2 e^{-\frac{\pi}{4} \omega} \, d\omega = \frac{1}{\pi} \frac{4}{i\pi} e^{\frac{\pi}{4} \omega} \bigg|_{-2}^{2}\]

\[= \frac{4}{\pi i} \left( e^{\frac{\pi}{2}} - e^{-\frac{\pi}{2}} \right) = \frac{8}{\pi} \sin \frac{\pi}{2} = \frac{8}{\pi^2}\]

c) \[X(\omega) = \begin{cases} 2 e^{j\omega}, & -2 < \omega < 0 \\ -2 e^{j\omega}, & \omega < -2 \end{cases}\]

\[x(0) = \frac{1}{2\pi} \int_{-2}^{0} -2 e^{j\omega} \, d\omega + \frac{1}{2\pi} \int_{0}^{2} 2 e^{j\omega} \, d\omega\]

\[= \frac{1}{\pi} j \omega \bigg|_{-2}^{0} + \frac{1}{\pi} j \omega \bigg|_{0}^{2} = -\frac{2}{\pi} j + \frac{j}{\pi} = 0\]