Exercise 5.104

L **Answer (d).**

We are given the function x, where

$$x(t) = \begin{cases} t^2+2t+1 & -2 \le t < 0 \\ -t^2+2t-\pi & 0 \le t < 2 \end{cases} \quad \text{and} \quad x(t) = x(t+4).$$

To begin, we observe that the function x satisfies the Dirichlet conditions. Therefore, at each point t_a of discontinuity of x, we have $y(t_a) = \frac{1}{2}\left[x(t_a^-)+x(t_a^+)\right]$. (Also, at each point of continuity t of x, we have $y(t) = x(t)$.) Thus, we have

$$\begin{aligned} y(0) &= \tfrac{1}{2}\left[x(0^-)+x(0^+)\right] && \text{x not continuous at 0 See A} \\ &= \tfrac{1}{2}\left[1+(-\pi)\right] && \text{evaluate x(...)} \\ &= \tfrac{1-\pi}{2} \quad \text{and} && \text{simplify} \\ y(1) &= x(1) && \text{x continuous at 1} \\ &= -1^2+2(1)-\pi && \text{evaluate x(1)} \\ &= 1-\pi. && \text{simplify} \end{aligned}$$

A $\begin{cases} x(0^+) = \left[-t^2+2t-\pi\right]\Big|_{t=0} = -\pi \\ x(0^-) = \left[t^2+2t+1\right]\Big|_{t=0} = 1 \end{cases}$

$x(1) = \left[-t^2+2t-\pi\right]\Big|_{t=1} = -1^2+2-\pi = 1-\pi$