1(c) $x(t) = a_0 + \sum_{n=1}^{\infty} \left(a_n \cos n\omega t + b_n \sin n\omega t\right)$

Step 1: $a_0 = \frac{1}{T}\int_0^T x(t)\,dt$

since $T = 2$

$\Rightarrow a_0 = \frac{1}{2}\int_0^2 x(t)\,dt$

$\Rightarrow a_0 = \frac{1}{2}\left[\int_0^1 1\cdot dt + \int_1^2 (2-t)\,dt\right]$

$\Rightarrow a_0 = \frac{1}{2}\left[[1-0] + 2[2-1] - \left[\frac{t^2}{2}\right]_1^2\right]$

$\Rightarrow a_0 = \frac{1}{2}\left[1 + 2 - \left[2 - \frac{1}{2}\right]\right]$

$\Rightarrow a_0 = \frac{1}{2}\left[3 - 3/2\right] = \frac{1}{2} \times 3/2 = 3/4$

$a_n = \frac{2}{T}\int_0^T x(t)\cdot \cos\omega t\,dt$

$\omega = \frac{2\pi}{T} \Rightarrow \omega = \frac{2\pi}{2} = \pi$

$\Rightarrow a_n = \frac{2}{2}\int_0^2 x(t)\cos \pi t\,dt$

$a_n = \int_0^2 x(t)\cos \pi t\,dt$

$$\Rightarrow a_n = \frac{(-1)^n - 1}{\pi^2 n^2}$$

$$b_n = \frac{2}{T}\int_0^T x(t) \sin \omega t$$

$$T = 2, \quad \omega = \frac{2\pi}{T} \Rightarrow \omega = \frac{2\pi}{2} = \pi$$

$$b_n = \int_0^2 x(t) \sin \pi t$$

$$b_n = \frac{1 - (-1)^n}{\pi n} \quad \underline{\text{Ans}}$$