1. Suppose we are given the following information about a signal $x[n]$

    1. $x[n]$ is real and even signal.
    2. $x[n]$ has period $N = 10$ and Fourier coefficients $a_k$
    3. $a_{11} = 5$.
    4. $\frac{1}{10} \sum_{k=0}^{9} |x[n]|^2 = 50$

    Show that $x[n]$ is of the form $A\cos(Bn + C)$, and specify the numerical values of $A, B$ and $C$.

2. For each of the signal shown in Fig. 1, find the Trigonometric Fourier series expansion of the signal.
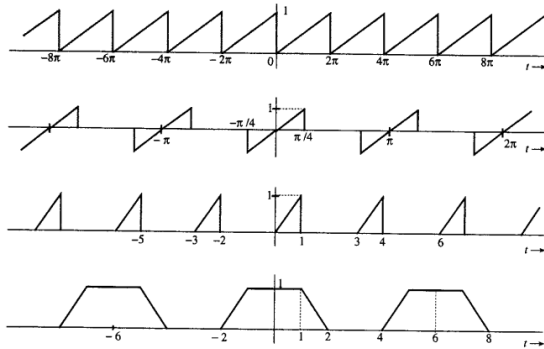


Figure 1

3. Determine the Fourier series representation for the following signals,

    a) $x_1(t)$ is periodic with period 2 and

    $$x_1(t) = e^{-t} \quad \text{for } -1 < t < 1$$

    b) $x_2(t)$ is periodic with period 2 and

    $$x_2(t) = \begin{cases} t & \text{for } 0 \le t \le 1 \\ 2 - t & \text{for } 1 \le t \le 2 \end{cases}$$

    Also, determine the Fourier series representation of $\frac{dx_2(t)}{dt}$

    c) $x[n]$ periodic with period 12 and

    $$x[n] = 1 - \sin(\frac{\pi n}{4}) \quad \text{for } 0 \le n \le 11$$

—— END ——