(Q1) Classify the following signals using one descriptor each from A, B, C, & D from the following list

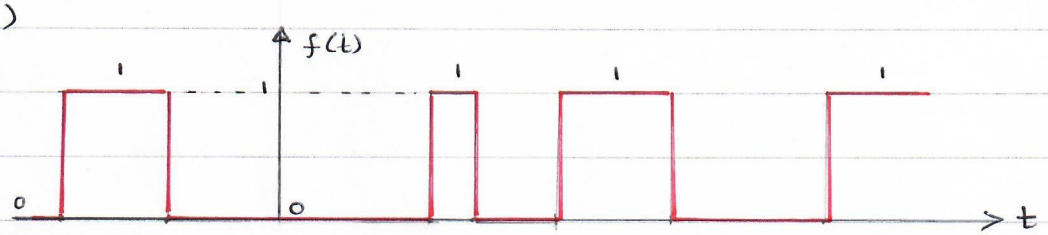
A	B	C	D
Continuous Discontinuous	Time continuous Time discrete	Amplitude continous Amplitude discrete Binary	Periodic Aperiodic

i) $\cos(\omega_0 t)$ for $-\infty < t < \infty$

ii) $f(t) = 2$ for $0 < t \leq 8$ and '0' elsewhere

iii) $f(t) = \cos(\omega_0 t)$ where $\omega_0 = \frac{2\pi}{T}$ with $t = \frac{nT}{N}$ $n \in \mathbb{Z}$ $N >> 1$

iv)



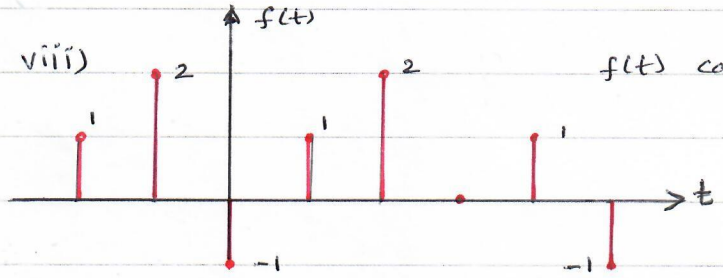
v) $\sin(1000t) + \cos(4000t)$ where $t \in \mathbb{R}$

vi) $f(t) = e^{-2t}$ for $t \geq 0$

$= 0$ elsewhere

vii) $f(t) = e^{-t^2/2}$ for $-\infty < t < \infty$

viii)



f(t) can take only -1, 0, 1, and 2 values

(Q2) Two signals $f_1(t) = A\cos(\omega t)$ and $f_2(t) = A\cos(\omega t + \theta)$ are multiplied to get $f(t) = A^2\cos(\omega t)\cos(\omega t + \theta)$. What is the average and RMS value of $f(t)$?

(Q3) Let $x_1(t)$ and $x_2(t)$ be periodic with period T_1 and T_2 respectively. What is the condition to make the signal $x_1(t) + x_2(t)$ periodic ?

(Q4) A signal $f(t) = \begin{cases} 0 & \text{for } -\infty < t < 0 \\ e^{-\alpha t} & \text{for } 0 \le t < \infty \end{cases}$

What is the DC value and the power of the signal.

Q5. A linear time invariant system yields output $y(t)$ for an input $x(t)$ as shown in Fig. Q a). What will be the system's output for an input $x_1(t)$ shown in Fig. Q b)?

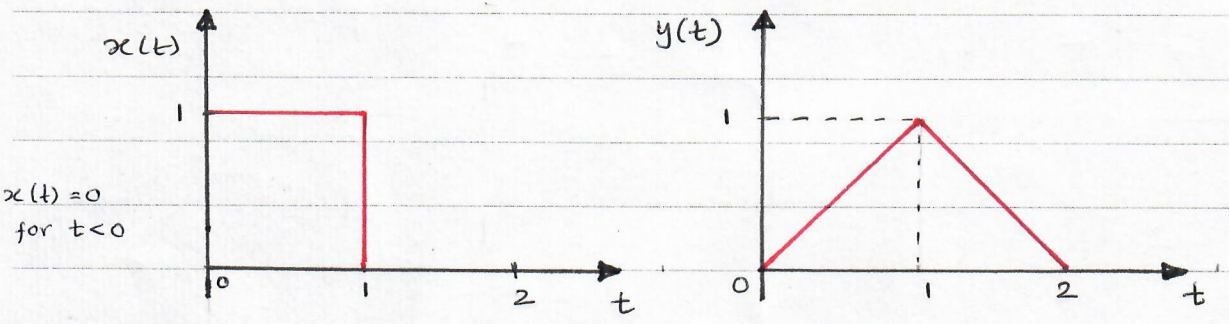


Fig. Q a

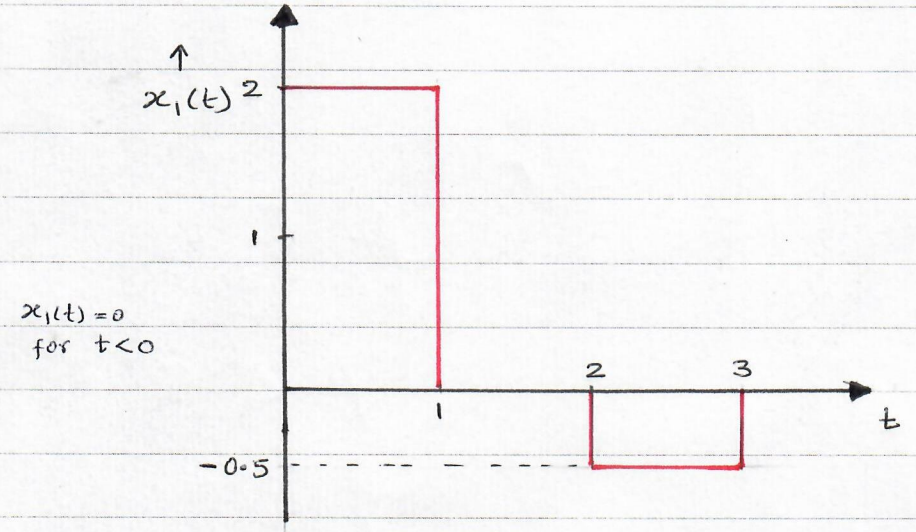


Fig. Q b