

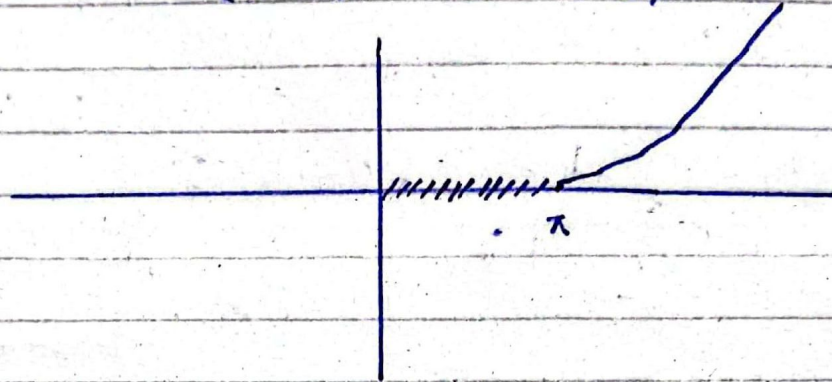
6.3

2-17 ODD

3. $g(t) = f(t-\pi)U_\pi(t)$, where $f(t) = t^2$

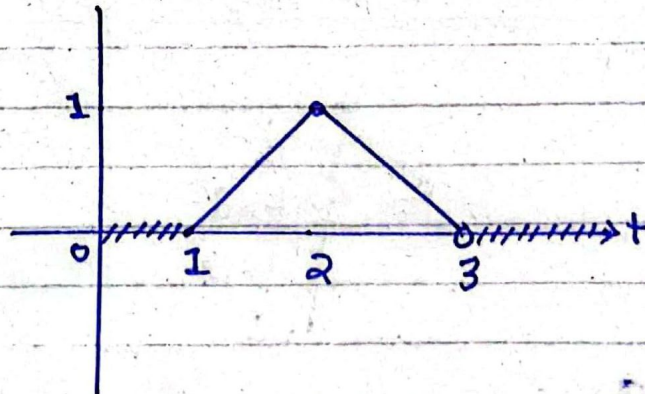
$g(t) = f(t-\pi)U(t-\pi)$

$$g(t) = \begin{cases} 0 & 0 \leq t < \pi \\ (t-\pi)^2 & t \geq \pi \end{cases}$$



6. $g(t) = (t-1)U_1(t) - 2(t-2)U_2(t) + (t-3)U_3(t)$
 $g(t) = (t-1)U(t-1) - 2(t-2)U(t-2) + (t-3)U(t-3)$

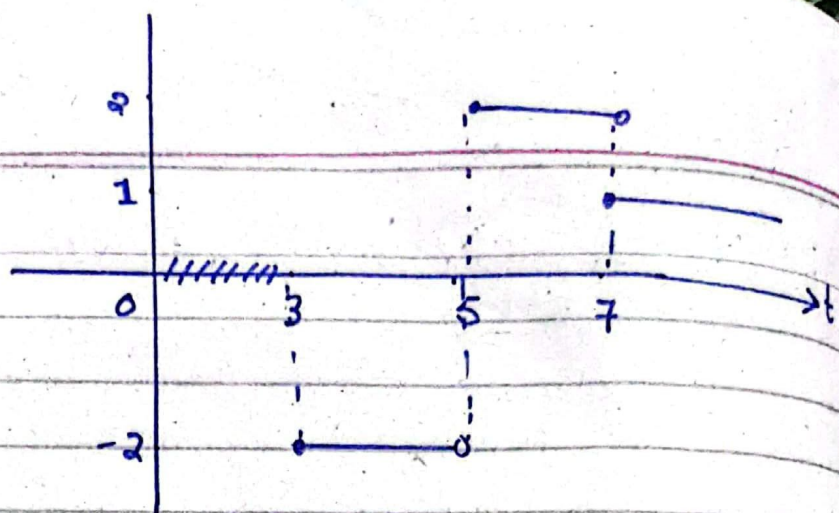
$$g(t) = \begin{cases} 0 & 0 \leq t < 1 \\ t-1 & 1 \leq t < 2 \\ -t+3 & 2 \leq t < 3 \\ 0 & t \geq 3 \end{cases}$$



(7) $f(t) = \begin{cases} 0 & 0 \leq t < 3 \\ -2 & 3 \leq t < 5 \\ 2 & 5 \leq t < 7 \\ 1 & t \geq 7 \end{cases}$

(t-2)

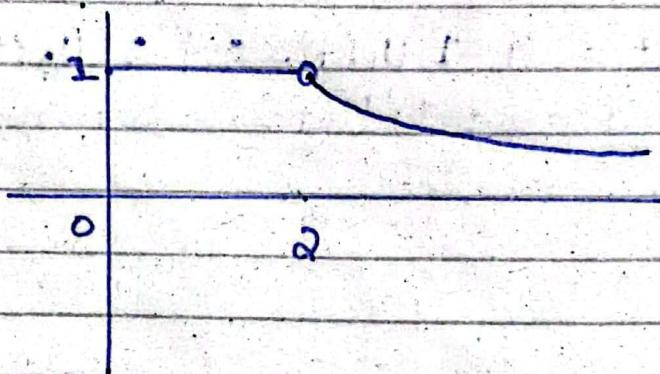
a)



b) $f(t) = -2u_3(t) + 4u_5(t) - u_7(t)$

9.
$$f(t) = \begin{cases} 1 & 0 \leq t < 2 \\ e^{-(t-2)} & t \geq 2 \end{cases}$$

a)



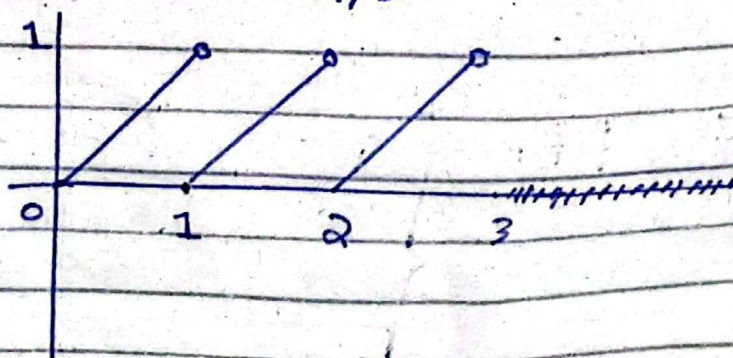
b

$$f(t) = 1 + (e^{-(t-2)} - 1)u_2(t)$$

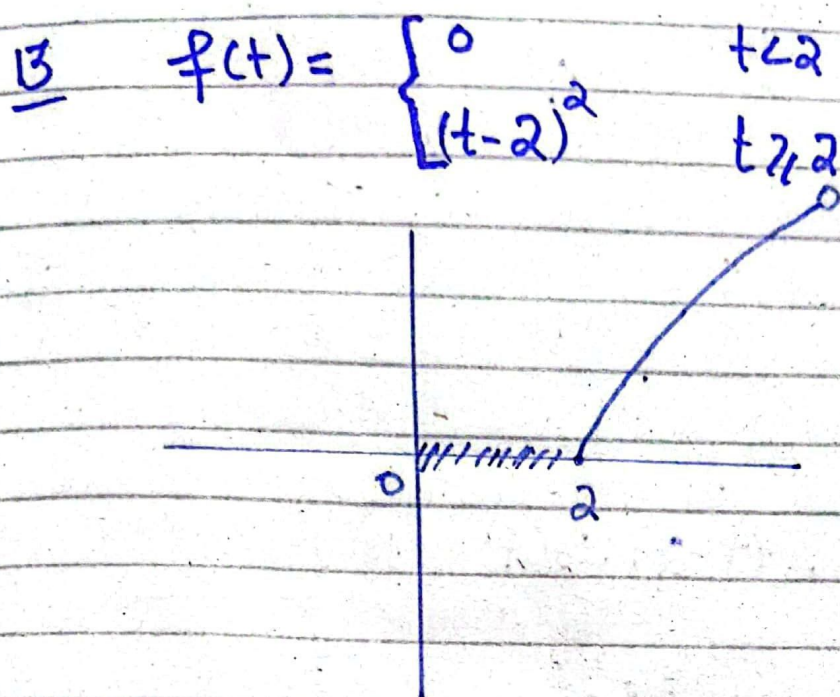
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$$f(t) = \begin{cases} 1 & 0 \leq t < 1 \\ t-1 & 1 \leq t < 2 \\ t-2 & 2 \leq t < 3 \\ 0 & t \geq 3 \end{cases}$$

a)



(b) $t - U_1(t) - U_2(t) + (-t+2)U_3(t)$



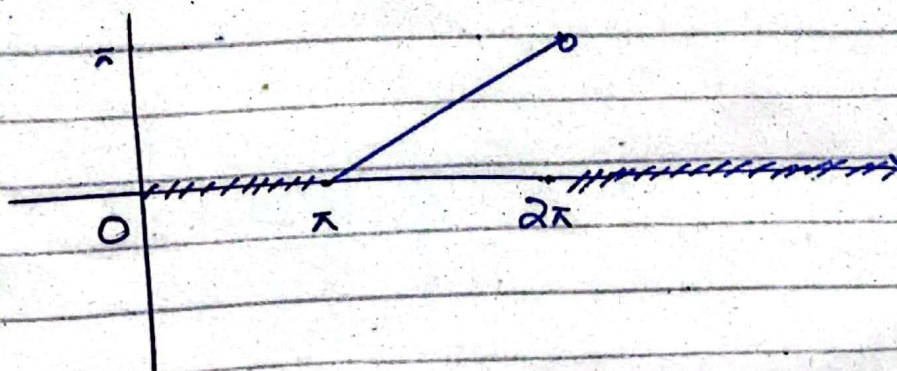
- Steps to be followed.
1. sketch
 2. Write in terms of unit step function
 3. Find its Laplace transform.

$$f(t) = (t-2)^2 \cdot U_2(t) = (t-2)^2 \cdot U(t-2)$$

$$= \frac{2!}{s^2} e^{-2s}$$

$$\therefore \mathcal{L}\{f(t-a)U(t-a)\} = F(s)e^{-as}$$

15. $f(t) = \begin{cases} 0 & t < \pi \\ t-\pi & \pi \leq t < 2\pi \\ 0 & t \geq 2\pi \end{cases}$



$$f(t) = (t-\pi) \cdot U_\pi + (\pi-t)U_{2\pi} = (t-\pi)U(t-\pi) + (\pi-t)U(t-2\pi)$$

$$f(t) = (t-\pi)U(t-\pi) - (t-\pi)U(t-2\pi)$$

$$= \frac{1}{s^2} e^{-\pi s} - \frac{1}{s^2} e^{-2\pi s}$$

$$\therefore \mathcal{L}\{f(t-a)u(t-a)\} = F(s)e^{-as}$$

$$f(t) = (t-\pi)u(t-\pi) - (t-\pi+\pi-\pi)u(t-2\pi)$$

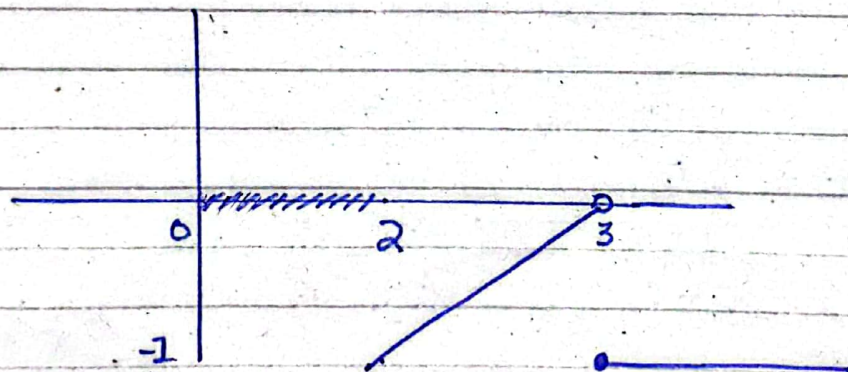
$$= (t-\pi)u(t-\pi) - \underbrace{(t-2\pi+\pi)}_{\substack{A \\ B}}u(t-2\pi)$$

$$= (t-\pi)u(t-\pi) - (t-2\pi)u(t-2\pi) - \pi u(t-2\pi)$$

$$= \frac{1}{s^2}e^{-\pi s} - \frac{1}{s^2}e^{-2\pi s} - \pi \frac{1}{s}e^{-2\pi s}$$

17 $f(t) = (t-3)u_2(t) - (t-2)u_3(t)$

$$f(t) = \begin{cases} 0 & 0 \leq t < 2 \\ t-3 & 2 \leq t < 3 \\ -1 & t \geq 3 \end{cases}$$



$$= (t-3)u(t-2) - (t-2)u(t-3)$$

$$= (t-2-1)u(t-2) - \underbrace{(t-2+1)}_{t-2+1}u(t-3)$$

$$= (t-2)u(t-2) - 1u(t-2) - (t-3)u(t-3) - 1u(t-3)$$

$$= \frac{1}{s^2}e^{-2s} - \frac{1}{s}e^{-2s} - \frac{1}{s^2}e^{-3s} - \frac{1}{s}e^{-3s}$$

$$= \frac{1}{s^2} [e^{-2s} - e^{-3s} - se^{-2s} - se^{-3s}] = \frac{1}{s^2} [e^{-2s}(1-s) - e^{-3s}(1+s)]$$