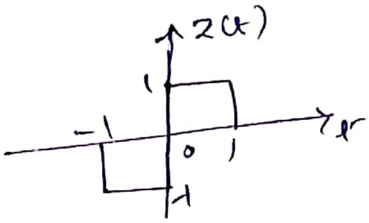
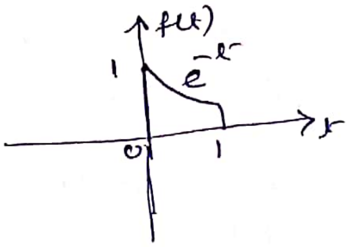
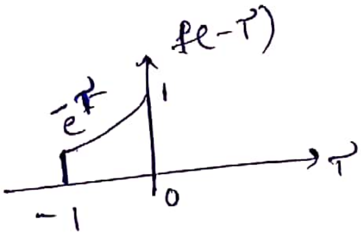
QP A -



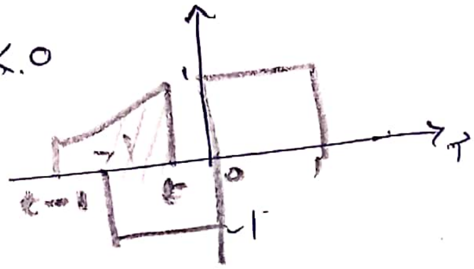




$$y(t) = \int_{-\infty}^{\infty} x(\tau)\, f(t-\tau)\, d\tau$$

for $t < -1$, $y(t) = 0$ & for $t > 2 \Rightarrow y(t) = 0$.

$-1 < t \leq 0$



$$y(t) = \int_{-1}^{t} x(\tau)\, f(t-\tau)\, d\tau.$$

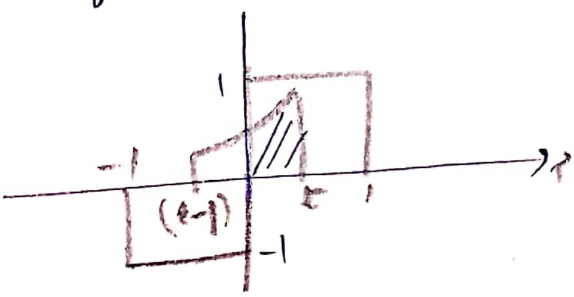
$$= \int_{-1}^{t} (-1)\left(e^{-(t-\tau)}\right) d\tau.$$

$$= -e^{-t} \int_{-1}^{t} e^{+\tau}\, d\tau$$

$$= -e^{-t}\left[e^{-t} - e^{-1}\right]$$

$$= -e^{-2t} + e^{-(t+1)} = e^{-2t}\left(e^{t-1} - 1\right)$$

for $0 < t < 1$



$$y(t) = \int_{t-1}^{0} (-1)\, e^{-t+\tau}\, d\tau + \int_{0}^{t} e^{-t+\tau}\, d\tau$$

$$-e^{-t}\left[e^{0} - e^{t-1}\right] + e^{-t}\left[e^{t} - e^{0}\right]$$

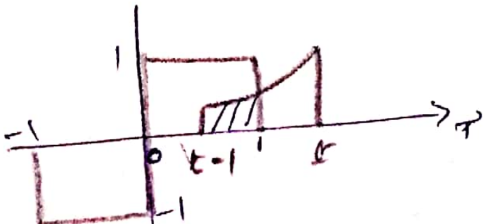
$$= -e^{-t}\left[e^{0} - e^{t-1} - e^{t} + e^{0}\right]$$

$$= e^{-t}\left[2e^{0} - e^{t-1} - e^{t}\right]$$

$$= 2e^{-t} - e^{-1} - 1$$

$$y(t) = 2e^{-t} - 1.3678$$

$1 < t < 2$.



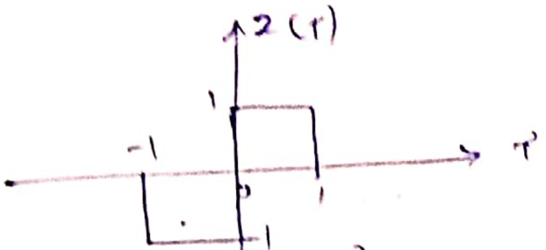
$$y(t) = \int_{t-1}^{1} x(\tau)\, f(t-\tau)\, d\tau$$

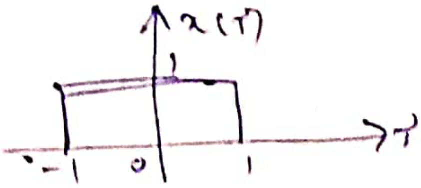
$$= \int_{t-1}^{1} e^{-(t-\tau)}\, d\tau = e^{-t}\left[e - e^{+(t-1)}\right]$$

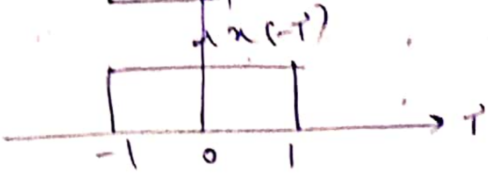
$$y(t) = e^{1-t} - e^{-2t+1}$$

$$
\therefore y(t) = \begin{cases} 0 & t < -1 \\ e^{-2t}\left[e^{(t-1)} - 1\right], & -1 < t < 0 \\ 2e^{-t} - 1.3678, & 0 < t < 1 \\ e^{(1-t)} - e^{-1}, & 1 < t < 2 \\ 0 & t > 2. \end{cases}
$$

Q-B

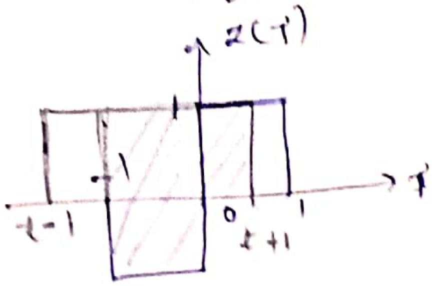






$|t| > 2$, $y(t) = 0$.

$-1 < t < 0$



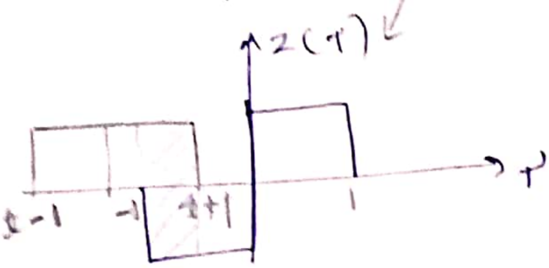
$$y(t) = \int_{-1}^{0} 1 \times -1 \, d\tau + \int_{0}^{1+t} 1 \times 1 \, d\tau$$

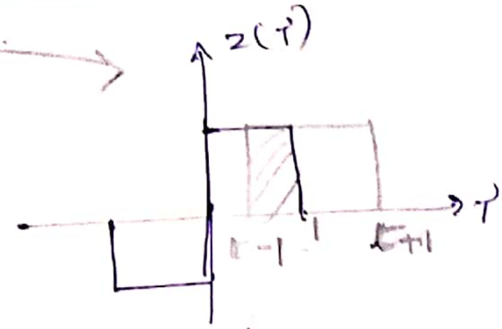
$$= -1\left[0-(-1)\right] + 1\left[1+t-0\right]$$

$$\boxed{y(t) = -1 + 1 + t = t.}$$

|||ly $\boxed{y(t) = +t, \text{ for } 0 < t < 1}$

for $-2 < t < -1$ or $1 < t < 2$.





$$y(t) = \int_{-1}^{t+1} 1 \times -1 \, d\tau$$

$$= -1\left[t+1+1\right]$$

$$= -t - 2$$

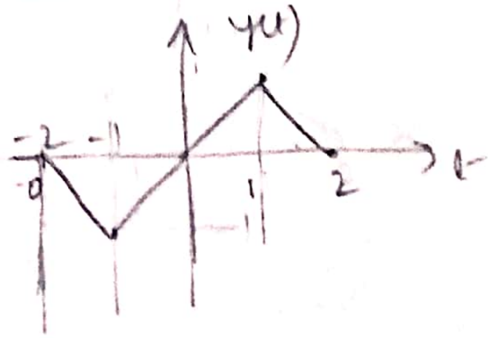
$$\therefore \boxed{y(t) = -t - 2}.$$

$$y(t) = \int_{t-1}^{1} 1 \times 1 \, d\tau = 1 - (t-1)$$

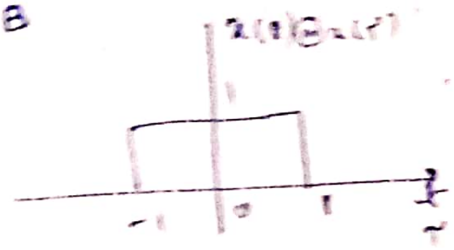
$$= -t + 2$$

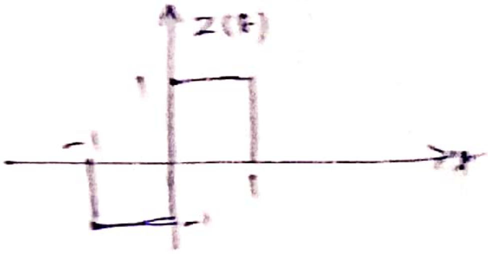
$$\boxed{y(t) = -t + 2}$$

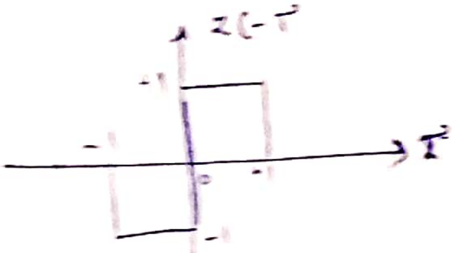
$$\therefore \; y(t) = \begin{cases} 0, & |t| > 2 \\ t, & 0 < |t| < 1 \\ -t-2, & -2 < t < -1 \\ -t+2, & 1 < t < 2 \end{cases}$$



Q·3





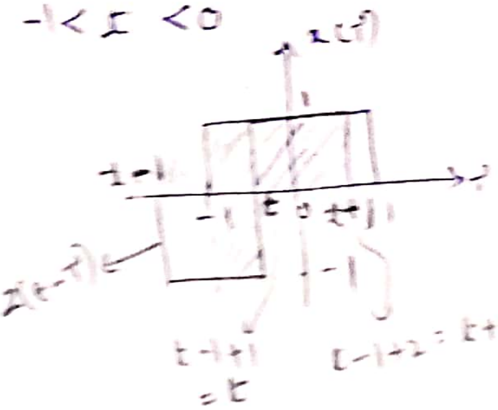


$t < -2, \; y(t) = 0$

$t > 2, \; y(t) = 0$

$$y(t) = \int_{-\infty}^{\infty} x(\tau)\, z(t-\tau)\, d\tau$$

$-1 < t < 0$



$$y(t) = \int_{-1}^{t} x(\tau)\, z(t-\tau)\, d\tau + \int_{t}^{1+t} x(\tau)\, z(t-\tau)\, d\tau$$

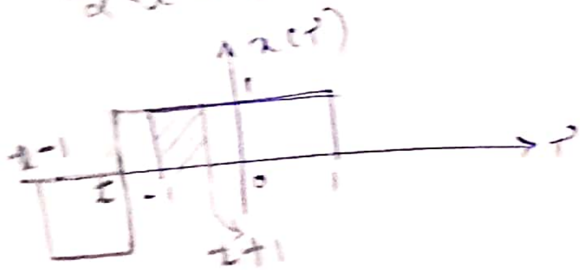
$$= \int_{-1}^{t} 1\times -1\, d\tau + \int_{t}^{1+t} 1\times 1\, d\tau$$

$$= -1[t-(-1)] + 1[1+t-t]$$

$$= -t-1+1 = -t$$

$|||^{ly}$ for $0<t<1$ $\quad y(t) = -t.$

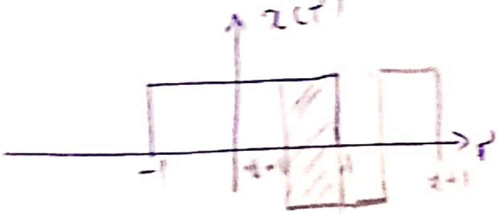
$-2 < t < -1$



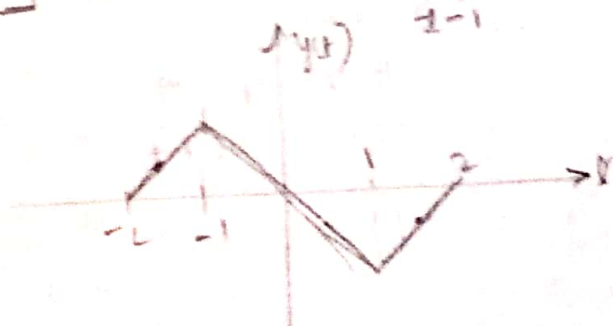
$$y(t) = \int_{-1}^{t+1} x(\tau)\, z(t-\tau)\, d\tau$$

$$= \int_{-1}^{t+1} 1\times 1\, d\tau = t+1+1 = t+2$$

$$\boxed{y(t) = t+2}$$

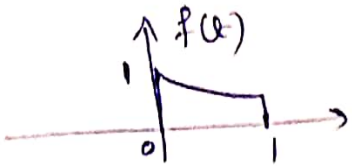


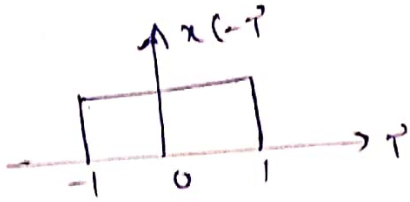
$|||^{ly}$ $\quad y(t) = \int_{t-1}^{1} 1\times -1\, d\tau = -1[1-t+1] = -2+t$



$$y(t) = \begin{cases} 0, & t>2 \\ -t, & 0<|t|<1 \\ t+2, & -2<t<-1 \\ t-2, & 1<t<2 \end{cases}$$

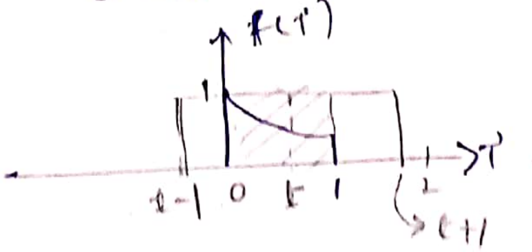
QC





for $t < -1$ $\quad y(t) = 0.$ & for $t > 2$, $y(t) = 0.$

$0 < t < 1$

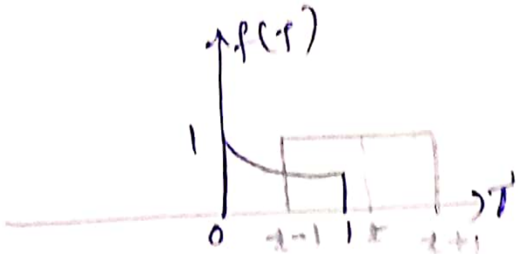


$$y(t) = \int_0^1 f(\tau)\, x(t-\tau)\, d\tau$$

$$= \int_0^1 e^{-\tau}\, d\tau = \left.\frac{e^{-\tau}}{-1}\right|_0^1 = -e^{-1} + e^0$$

$$y(t) = 1 - e^{-1} = 0.632$$

$1 < t < 2.$



$$y(t) = \int_{t-1}^{1} e^{-\tau}\, d\tau = \left.\frac{e^{-\tau}}{-1}\right|_{t-1}^{1}$$

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

$$y(t) = e^{-t+1} - e^{-1}$$

$$= e^{-t+1} - 0.3678$$

$$y(t) = \begin{cases} 0.632, & 0 < t < 1 \\ e^{-t+1} - 0.3678, & 1 < t < 2 \\ 0, & \text{o.w} \end{cases}$$

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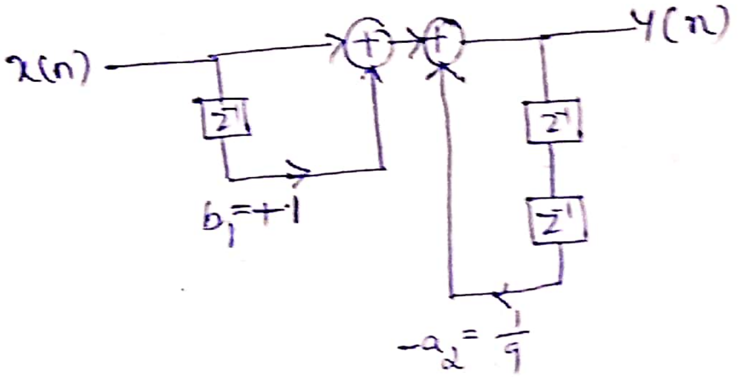
QP-A

Q2: $y(n) - \frac{1}{9} y(n-2) = x(n-1)$

DF-1

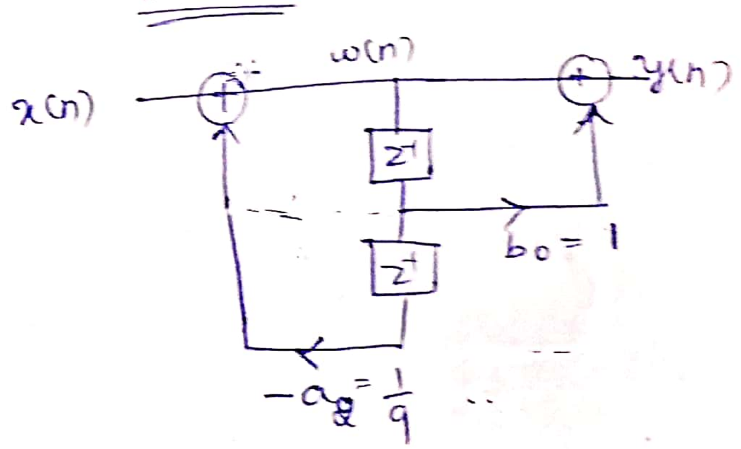
$y(n) = x(n-1) + \frac{1}{9} y(n-2)$

$Y(z) = z^{-1} X(z) + \frac{1}{9} z^{-2} X(z)$



$a_0 = 1$
$a_1 = 0$
$a_2 = -\frac{1}{9}$
$b_0 = 0$
$b_1 = 1$

DF-2



QP-B & C are similar with variations in coefficients

QP-B $\rightarrow$ $a_0 = 1$, $a_2 = -\frac{1}{3}$, $b_1 = 3$

QP-C $\rightarrow$ $a_0 = 1$, $a_2 = -9$, $b_1 = 2$.