2021

2.a $x(n) = \{\underset{x(0)}{1}, \overset{x(1)}{0}, \underset{x(2)}{1}, \overset{x(3)}{1}\}$ $h(n) = a^n u(n)$, $|a|<1$

↓ impulse response

Convolution, $y(n) = x(n) * h(n)$

$$= \sum_{k=-\infty}^{\infty} x(k)\, h(n-k)$$

$u(n) = \begin{cases} 1 & n \geq 0 \\ 0 & n<0 \end{cases}$

$h(n) = a^n u(n)$.

$n=0,\ h(0) = a^0 u(0) = 1$

$n=1,\ h(1) = a^1 u(1) = a$

$n=2,\ h(2) = a^2 u(2) = a^2$

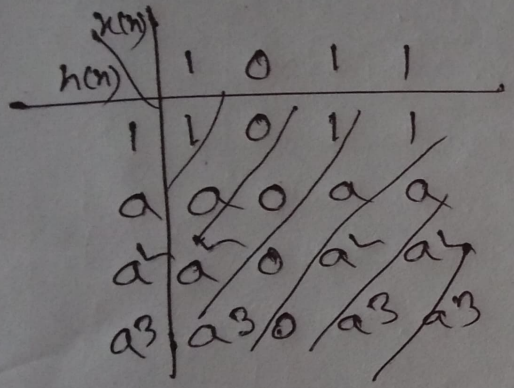
$n=3,\ h(3) = a^3 u(3) = a^3$ ....

$y(n) = x(n) * h(n)$

$$y(n) = \sum_{k=0}^{3} x(k)\, h(n-k)$$

$x(n) = 1, 0, 1, 1$

$h(n) = 1, a, a^2, a3$ $\quad h(-n) = a^3, a^2, a, 1$



$Y(n) = \{1, a, a^2+1, a^3+a+1, a^2+a, a3+a^2, a^3\}$

(Ans)