


$$
\begin{aligned}
& \sum_{m} x[m] \delta(n-m] \\
& 0 \oint_{1}, j \mid p, i i=(24)-n \quad x(-2) h(n+i)
\end{aligned}
$$

$$
\begin{aligned}
& \rightarrow \int_{-2} \int_{x[-1] n(-1)}
\end{aligned}
$$

$$
\begin{aligned}
& \pm \text { x(1) } \\
& +\prod_{x[1] \ln (n-2)}^{x(1)}
\end{aligned}
$$

1


$$
\sum_{m} h(m) \times(n-m)
$$



1-


$$
x[1]=\sum_{m=-\infty}^{\infty} x[m] \delta[n-m]
$$

닌
$\downarrow$

$$
\begin{aligned}
y^{(n)} & =\sum_{m=-\infty}^{\infty} x[m] h[n-m] h, \\
& =\sum_{-\infty}^{\infty} h(m) x[n-m]
\end{aligned}
$$

$$
m=-\cdots
$$

Written Example


$$
\begin{aligned}
& \text { Ir } T \text { LINEAR? } \\
& X_{1}(n) \longrightarrow y_{1}[n]=\sum_{m=-\infty}^{n} x_{1}(n) \\
& x_{2}[n] \longrightarrow y_{2}[n]=\sum_{m=-\infty}^{\infty} x_{2}[n] \\
& x[n]=x_{1}(n)+x_{2}[n] \\
& \longrightarrow y^{[n]} \longrightarrow 1
\end{aligned}
$$

ASK: is $y^{[a]}=Y_{1}(1)+Y_{2}(\cdot 1)$ ?

$$
\cos -\frac{n}{2} . \operatorname{c} 1
$$

$$
\begin{aligned}
y^{[n]} & =\sum_{m=-\infty} x[m] \\
& \left.=\sum_{m=-\infty}^{n}\left[x_{1} r_{m}\right]+x_{2}[m]\right) \\
& =\sum x_{1}[m]+\sum x_{2}[m] \\
& =y_{1}[n]+y_{2}[n]
\end{aligned}
$$

IT IS LINEAR
IS IT SHIFJ - INVARIANTI?

$$
\begin{aligned}
& x_{1}[n] \rightarrow r_{n}{ }_{n}^{n} \times 1_{i m}^{-} 1 \\
& \cdots د \quad y_{1 \cdots} \underset{m=-\infty}{ } \cdots \cdots \cdots \\
& x[1]=x_{1}[n-d] \\
& \rightarrow 21 \rightarrow y^{(a)} \\
& \text { is } y^{(n)}=y_{1}[n-d]^{?} \text {. } \\
& y[n]=\sum_{m=-\infty}^{n} x(m) \\
& =\sum_{m=-\infty}^{n} x_{1}[m-d]
\end{aligned}
$$

$$
\begin{aligned}
p & =m-d \quad m=n \text { AI } \quad p=n-d \\
m & =p+d \quad m=-\infty \quad A I p_{1}=-\infty \\
y[n] & =\sum_{p=-\infty}^{n-d} x_{1}[p] \\
& =Y_{1}[n-d] \quad
\end{aligned}
$$

H is SAlFT_INJARIANT

$$
\begin{aligned}
y[n] & =h[n] *[n] \\
& =\sum_{m=-\infty}^{\infty} h[m] x[n-m] \\
& =\sum_{m=-\infty}^{\infty} x(m) h[n-m]
\end{aligned}
$$

WIAAT is h(m)?
$h[m]$ is THE I MPUL.SE
RESPONSE!

$$
\delta[n] \rightarrow h+h(n]!
$$

$$
\begin{aligned}
& h[n]=\sum_{n=-\infty}^{n} \delta[n] \\
& \oint_{\infty}^{\delta(n)}\left\{\begin{array}{l}
1-1 \\
1
\end{array} \quad n \geq 0\right. \\
& 0 \quad n<0
\end{aligned}
$$

$$
\begin{aligned}
y[n] & =h * x \\
& =\left\{\sum_{m=-\infty}^{\infty} x[m] h[n-m]\right.
\end{aligned}
$$

$$
)\left(=\sum_{m=-\infty}^{n} x[m)<\right.\text { ORIGINAN }
$$

$\rightarrow$ EQUAL IFF

$$
\begin{aligned}
& h[n-m]= \begin{cases}1 & m \leq n \\
0 & 1 m>n\end{cases} \\
& h[n-m]= \begin{cases}1 & n-m \geq 0 \\
0 & n-m<0\end{cases}
\end{aligned}
$$

