(v) $\left(\frac{1}{4}\right)^{n-1} u[n-1]$

Time shifting property.

$$\mathcal{F}\{x[n-m]\} \longrightarrow e^{-j\omega m} X(e^{j\omega})$$

$$\mathcal{F}\left\{\left(\frac{1}{4}\right)^{n} u[n]\right\} \longrightarrow \frac{-4}{e^{-j\omega} - 4}$$

$$\mathcal{F}\left\{\left(\frac{1}{4}\right)^{n-1} u[n-1]\right\} \longrightarrow e^{-j\omega}\left[\frac{-4}{e^{-j\omega}-4}\right]. \quad m=1$$

ANALYSIS OF LTI system using DTFT:

Transfer function or frequency response.

$$H(e^{j\omega}) = \frac{Y(e^{j\omega})}{X(e^{j\omega})}$$ from $y[n] = x[n] * h[n]$ & transform is applied.

$H(e^{j\omega})$ gives the frequency response of discrete time system which is periodic in nature. with a period of 2π [period from $-\pi$ to π].

The frequency response $H(e^{j\omega})$ is a complex func: of frequency and it can be expressed as

$$H(e^{j\omega}) = H_R(e^{j\omega}) + H_I(e^{j\omega})$$

This can be split into two: Magnitude and phase ~~response~~ spectrum.

$$|He^{j\omega}| = \sqrt{[H_R(e^{j\omega})]^2 + [H_I e^{j\omega}]^2}$$

[Magnitude spectrum].