



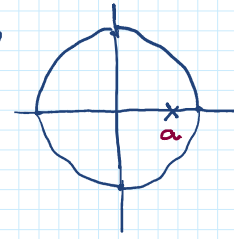
Example :

Source  impulse train of period  P samples


Filter : single real pole at " a "

$$H(z) = \frac{1}{1 - az^{-1}}$$

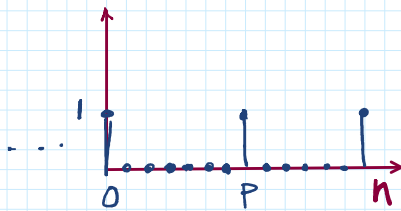
$$\Rightarrow h[n] = a^n u[n]$$



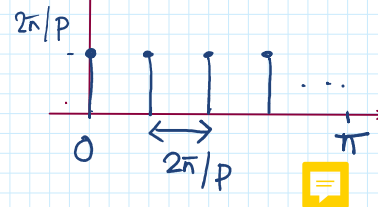
F_0 (Hz)



$x[n]$:



$|X(e^{j\omega})|$

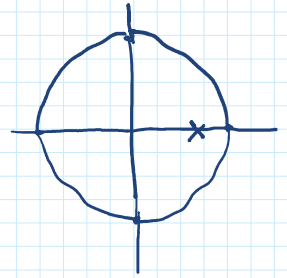


Example :

Source : impulse train of period = P samples

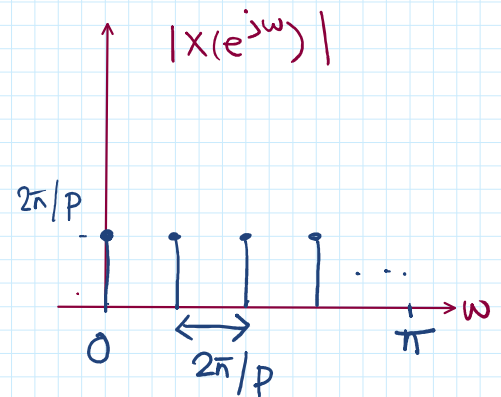
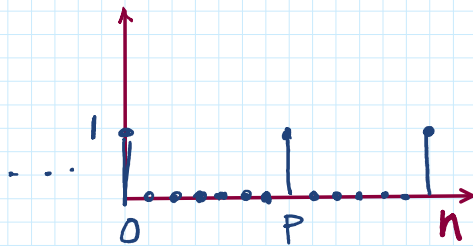
Filter : single real pole at " a "

$$H(z) = \frac{1}{1 - az^{-1}}$$

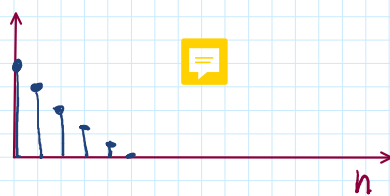


$$\Rightarrow h[n] = a^n u[n]$$

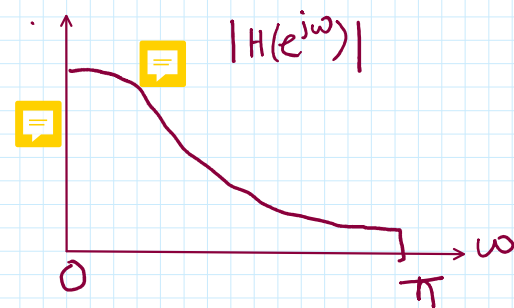
$x[n]$:



$h[n]$:



$S[n]$



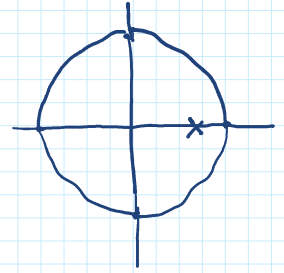
$$S(e^{j\omega}) =$$

Example :

Source : impulse train of period = P samples

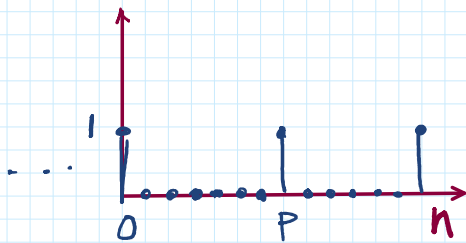
Filter : single real pole at " a "

$$H(z) = \frac{1}{1 - az^{-1}}$$



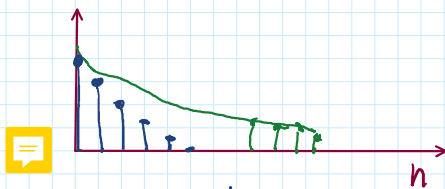
$$\Rightarrow h[n] = a^n u[n]$$

$x[n]$:



*

$h[n]$:

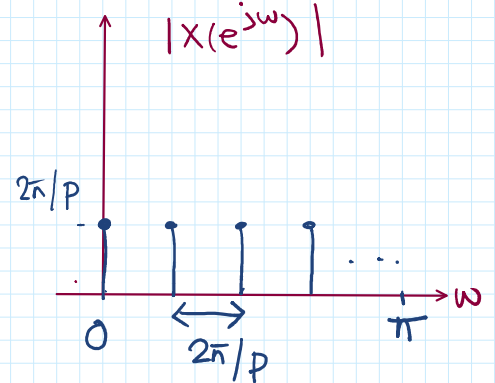


↓

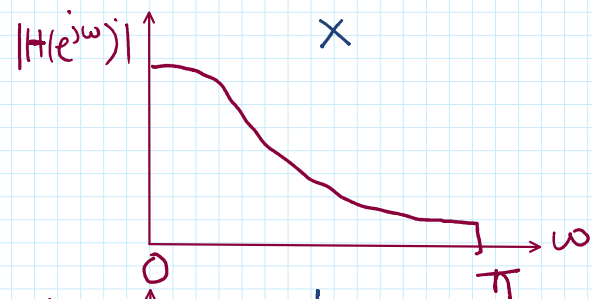
$s[n]$



$|X(e^{j\omega})|$

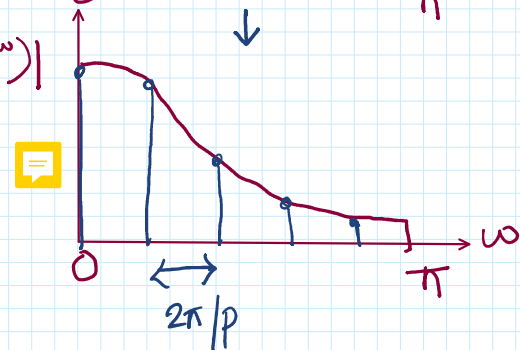


$|H(e^{j\omega})|$



↓

$|S(e^{j\omega})|$



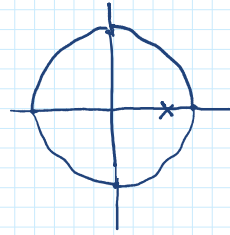
Example :

Source : impulse train of period = P samples

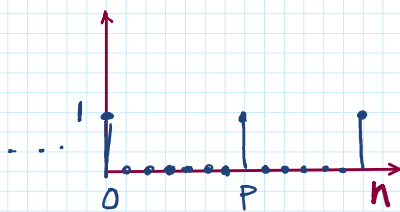
Filter : single real pole at " a "

$$H(z) = \frac{1}{1 - az^{-1}}$$

$$\Rightarrow h[n] = a^n u[n]$$

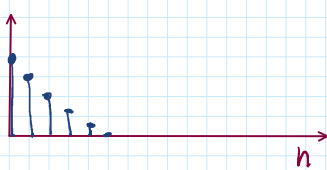


$x[n]$:

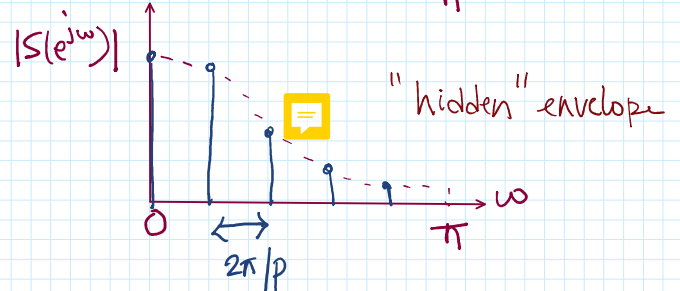
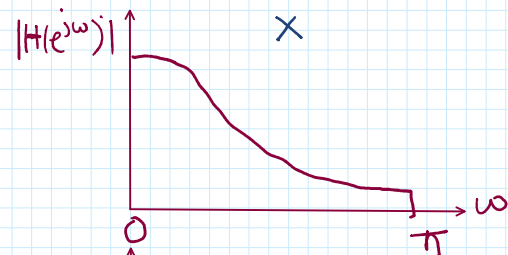
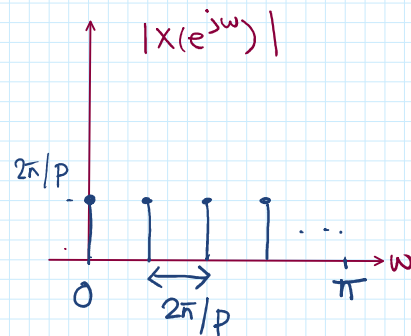
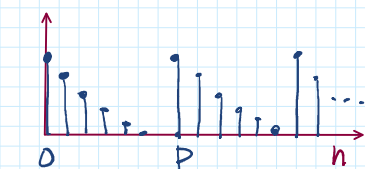


*

$h[n]$:



$s[n]$



Numerical example :

$f_s = 8000$ Hz , $F_1 = 1$ kHz , $B_1 = 150$ Hz , $F_0 = 100$ Hz .

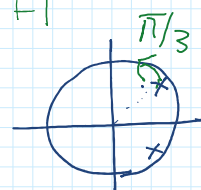
Sketch $|S(e^{j\omega})|$

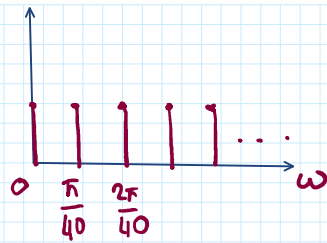
Soln : $P = 80$ samples

r_1, θ_1 : get from B_1, F_1

$r_1 = 0.94, \theta_1 = \pi/4$

$|X(e^{j\omega})|$





$$\omega = \frac{\pi}{40} \Rightarrow \Omega = \omega/T$$

$$\Downarrow$$

$$f_a = \frac{\omega}{2\pi T} = 100 \text{ Hz}$$

