

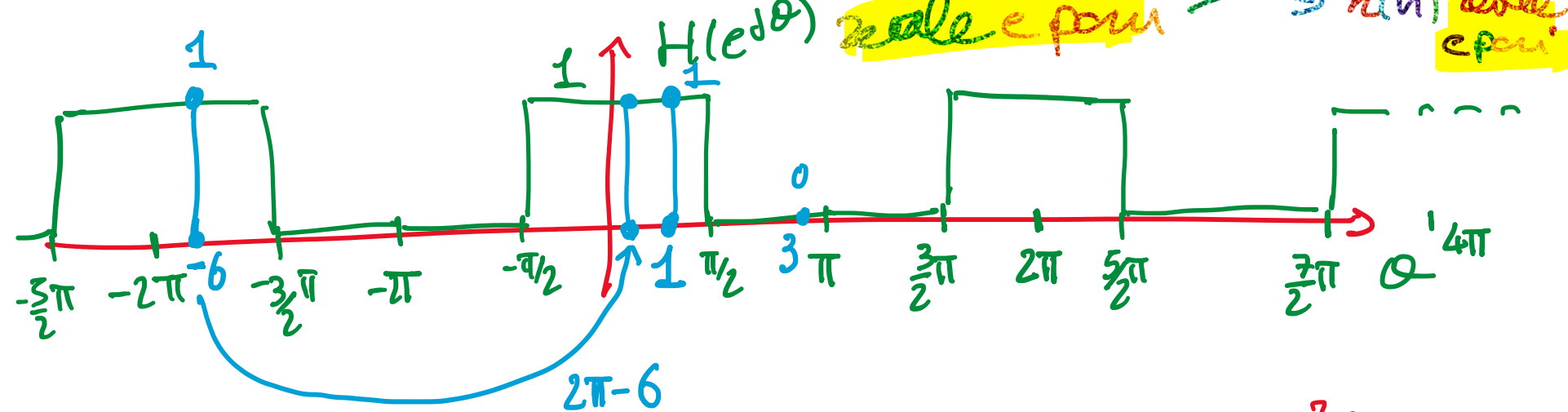
ES1

$$x(n) \rightarrow \boxed{h(\cdot)} \rightarrow y(n) = x * h(n)$$

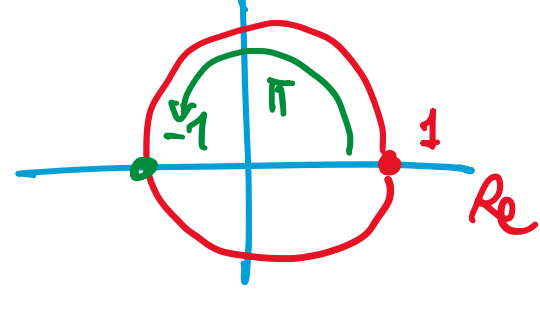
FILTRO PASSABASSO IDEALE $\theta_c = \pi/2$

$$x(n) = \cos(n) + \sin(3n) + e^{-j6n}$$

$$y(n) = |H(e^{j0})| \cos(n + \angle H(e^{j0})) + |H(e^{j3})| \sin(3n + \angle H(e^{j3})) + |H(e^{-j6})| e^{-j6n}$$



$$1 = 1 \cdot e^{j0}$$



$$-1 = 1 \cdot e^{j\pi}$$

$$y(n) = \cos(n) + e^{-j6n}$$

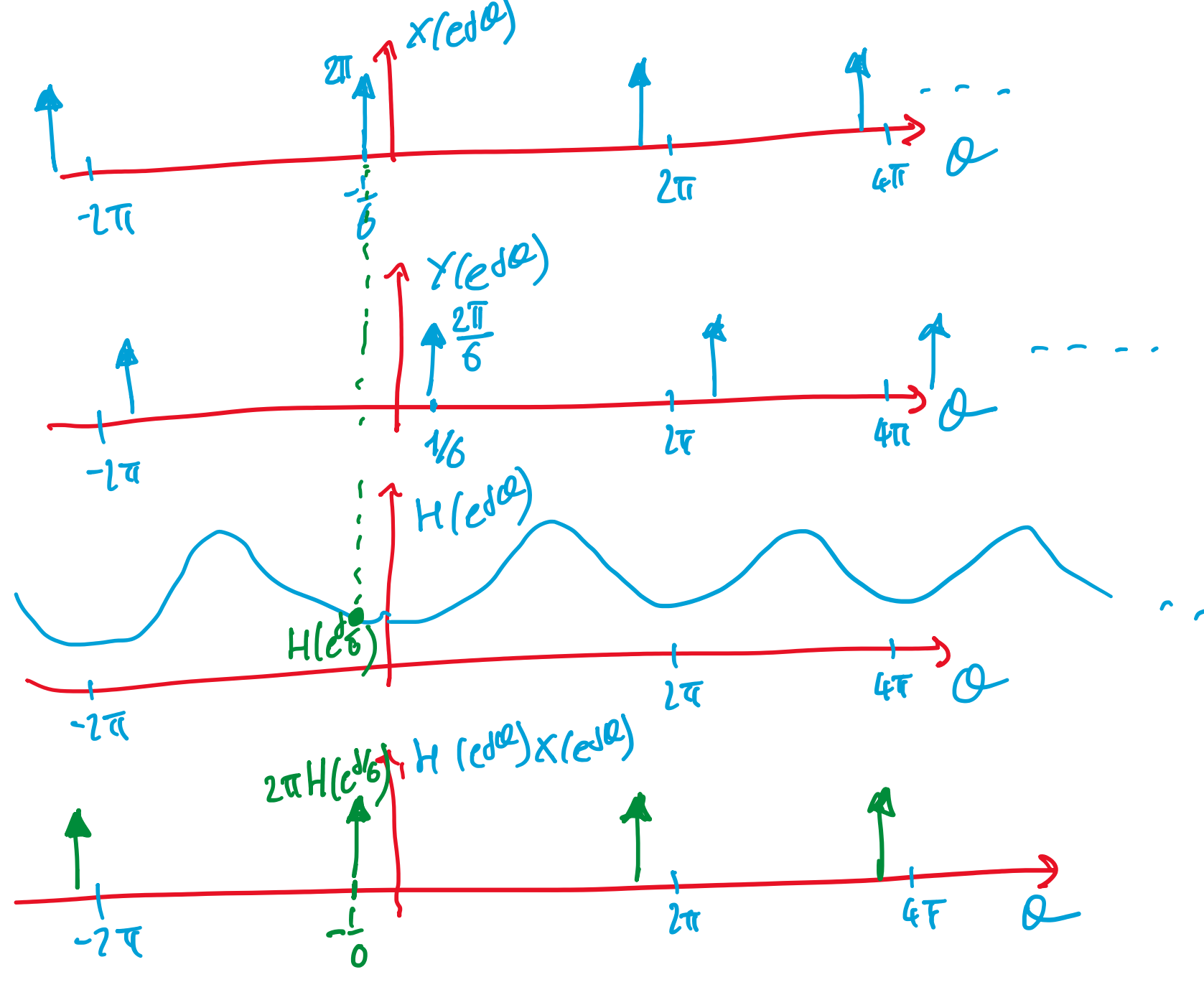
ES2 IDENTIFICARE $h(n)$ CHE GARANTISCA $x(n) = e^{j\pi/6}$ $y(n) = \frac{1}{6} e^{j\pi/6}$

$$x(n) \rightarrow \boxed{h(n)} \rightarrow y(n) = x * h(n)$$

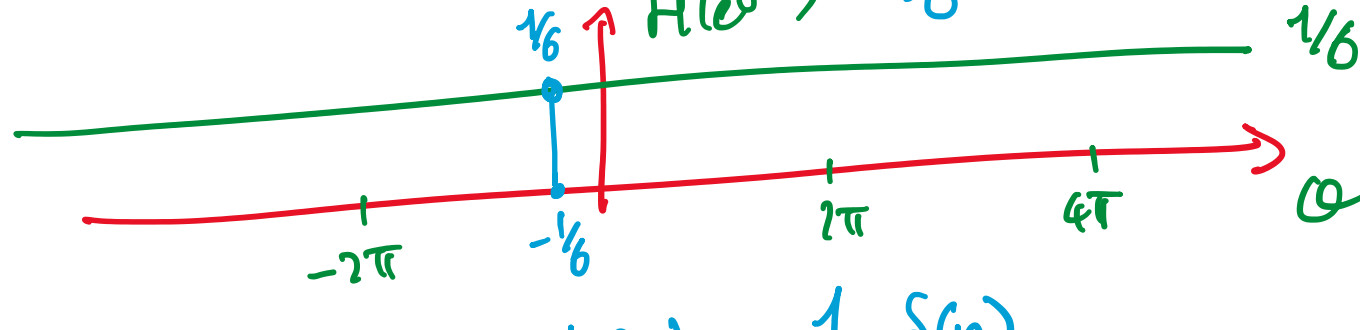
$$x(e^{j\omega}) \rightarrow \otimes \rightarrow y(e^{j\omega})$$

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

NON E' POSSIBILE!

ES3 STESSA COSA CON $x(n) = e^{-j\pi/6}$ $y(n) = \frac{1}{6} \cdot e^{-j\pi/6}$

$$x(n) = e^{-j\pi/6} \rightarrow \boxed{h(n)} \rightarrow \frac{1}{6} e^{-j\pi/6} = y(n)$$



$$h(n) = \frac{1}{6} \delta(n)$$

$$H(e^{j\omega}) = \sum_{n=-\infty}^{\infty} \frac{1}{6} \delta(n) e^{-j\omega n} = \frac{1}{6} e^{-j\omega 0} = \frac{1}{6}$$

ES4

$$x(n) \rightarrow \boxed{h(n)} \rightarrow z(n) \rightarrow \otimes \rightarrow y(n)$$

PASSABASSO IDEALE $\theta_c = \pi/2$

$$x(n) = \delta(n-1) - \delta(n+1)$$

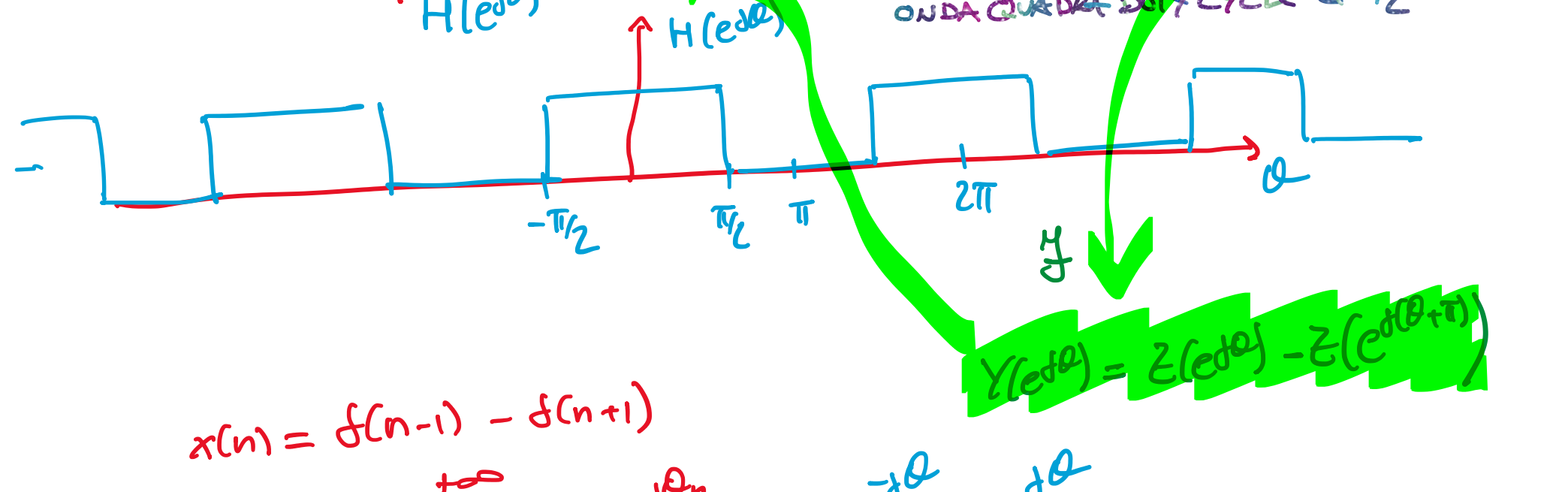
$$v(n) = 1 - e^{-j\pi n}$$

$$y(n) = ?$$

DOMINIO DI FOURIER

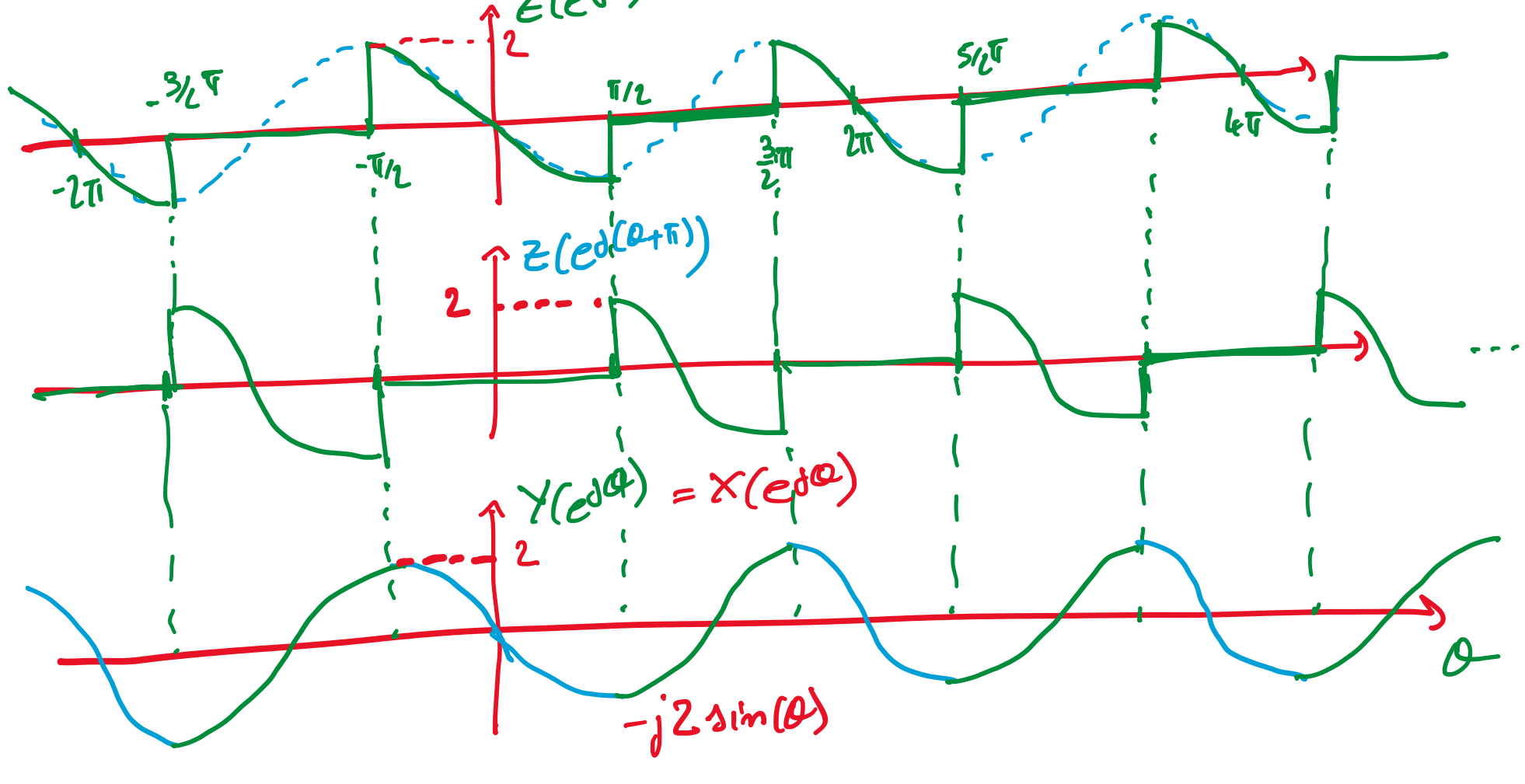
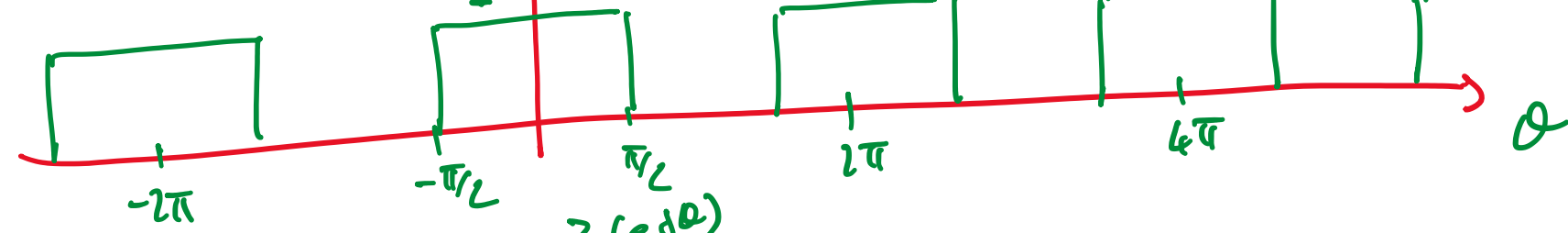
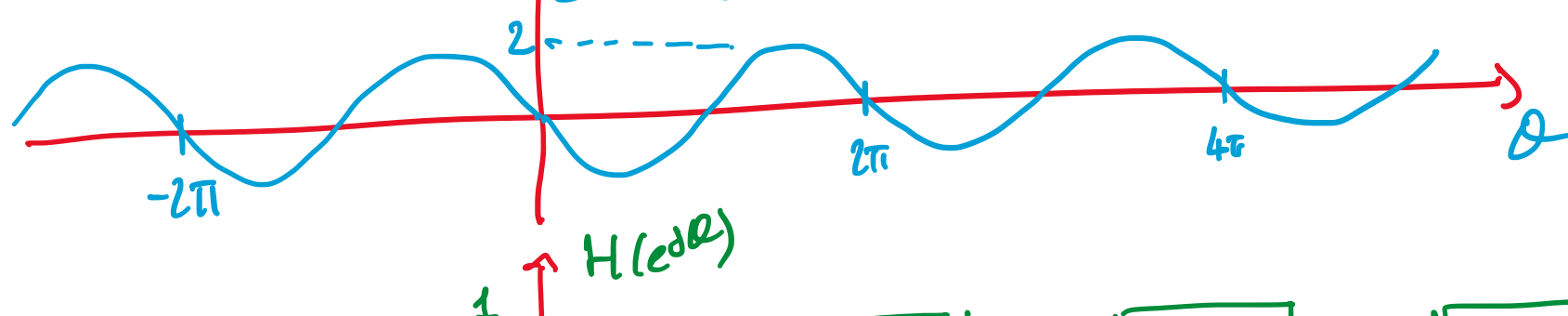
$$X(e^{j\omega}) \rightarrow \otimes \rightarrow Z(e^{j\omega}) \rightarrow \boxed{H(e^{j\omega})} \rightarrow Y(e^{j\omega})$$

$$y(n) = z(n) v(n) = z(n) (1 - e^{-j\pi n}) = z(n) - z(n) e^{-j\pi n}$$

ONDA QUADRA DIFFERENZE $\Delta = 1/2$ 

$$x(n) = \delta(n-1) - \delta(n+1)$$

$$X(e^{j\omega}) = \sum_{n=-\infty}^{\infty} x(n) e^{-j\omega n} = e^{-j\omega} - e^{j\omega} = -(e^{j\omega} - e^{-j\omega}) = -2j \sin \omega$$



$$y(n) = x(n) = \delta(n-1) - \delta(n+1)$$

DOMINIO DEL TEMPO

$$x(n) \rightarrow \boxed{h(n)} \rightarrow z(n) \rightarrow \otimes \rightarrow y(n)$$

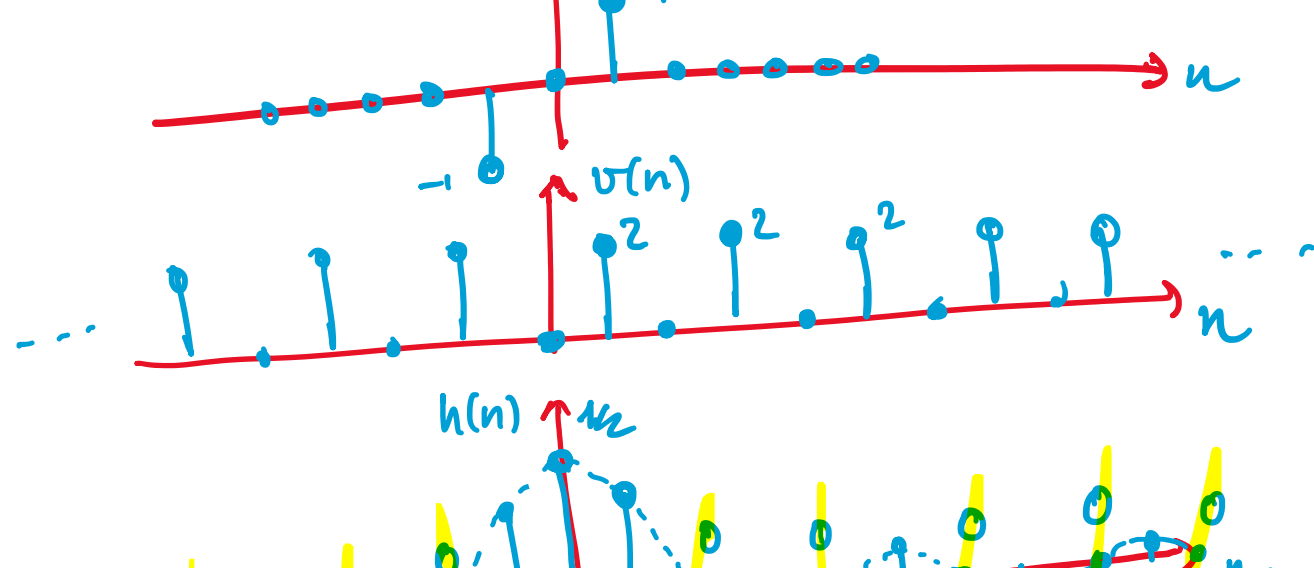
FILTRO PASSABASSO IDEALE $\theta_c = \pi/2$

$$x(n) = \delta(n-1) - \delta(n+1)$$

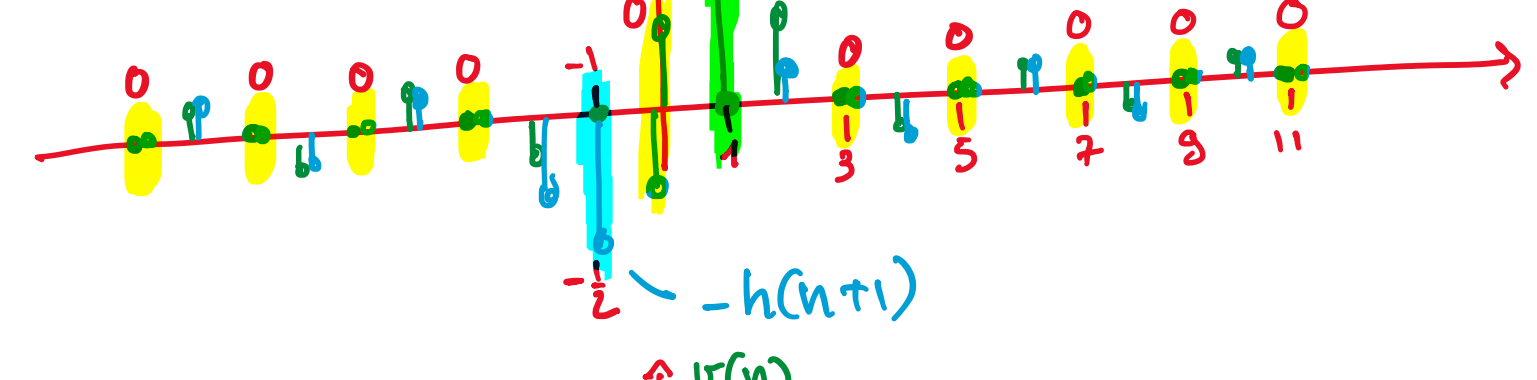
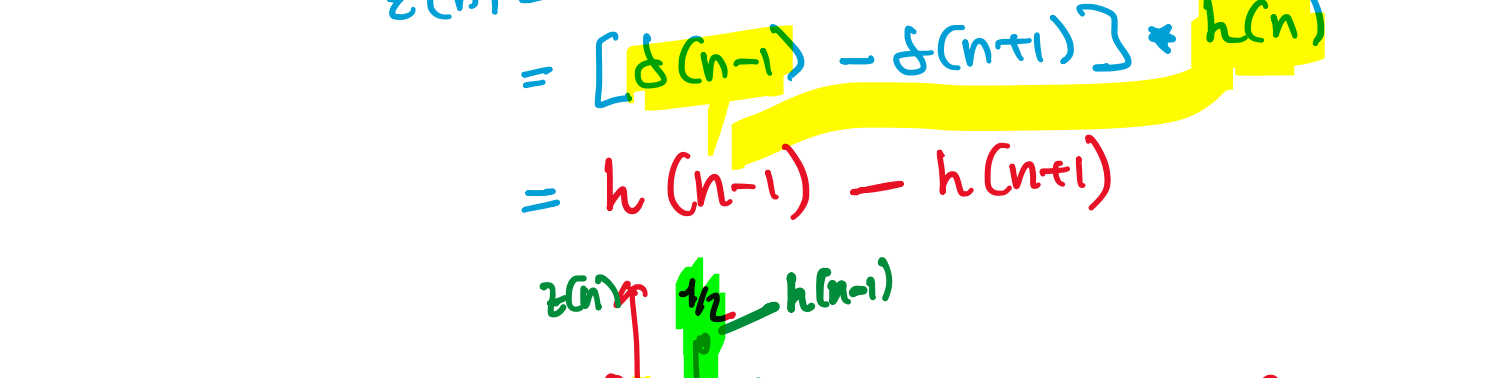
$$v(n) = 1 - e^{-j\pi n}$$

$$= 1 - (-1)^n$$

$$h(n) = \delta(n) \text{ sinc}(n\pi/2) = \frac{1}{2} \text{ sinc}(n\pi/2)$$



$$z(n) = x * h(n) = [\delta(n-1) - \delta(n+1)] * h(n) = h(n-1) - h(n+1)$$



$$y(n) = z(n) v(n) = x(n)$$