3) a) $h_1(k) = (1,1)$ significa $h(0)=1$ y $h(1) = 1$.

$h_2(k) = (1,1,1)$

Entonces:

-Transferencia:

- $H_1(z) = 1 + z^{-1} =$

- $H_2(z) = 1 + z^{-1} + z^{-2}$

- Singularidades:

$H_1(z)$ $\{$ Cero: $z^{-1} = -1$

$H_2(z)$ $\{$ Ceros:

- Módulo y fase:

$$H_1(e^{j\Omega}) = 1 + e^{-j\Omega} = 1 + e^{-j\frac{\Omega}{2}} e^{-j\frac{\Omega}{2}} = e^{-j\Omega/2} \left(\frac{e^{j\Omega/2} + e^{-j\Omega/2}}{2}\right) \cdot 2$$

$$H_1(e^{j\Omega}) = e^{-j\Omega/2} 2 \cos(\Omega/2)$$

$$\boxed{|H_1(e^{j\Omega})| = 2 \cos(\Omega/2)}$$

$$\boxed{\phi(H) = -\Omega/2}$$

$$H_2(e^{j\Omega}) = 1 + e^{-j\Omega} + e^{-2j\Omega} = 1 + e^{-j\Omega} + e^{-j\Omega} e^{-j\Omega}$$

$$= 2e^{-j\Omega} \left(\left(\frac{e^{j\Omega} + e^{-j\Omega}}{2}\right) + \frac{1}{2}\right) = 2e^{-j\Omega} (\cos(\Omega) + 1/2)$$

$$\boxed{|H_2(e^{j\Omega})| = 2\cos(\Omega) + 1}$$

$$\phi(H) = -\Omega$$

* Para obtener el promedio o media aritmética, se debería dividir por la cantidad de muestras tomadas.

NOTA

b) $h_1(k) = (1, -1)$

$h_2(k) = (1, 0, -1)$

Entonces:

- Transferencia:

$H_1(z) = 1 - z^{-1}$

$H_2(z) = 1 - z^{-2}$

- Singularidades:

$H_1(z) \{$ cero $\Rightarrow z^{-1} = 1$

$H_2(z) \{$ ceros $\Rightarrow z^{-1} = \pm 1$

- Módulo y fase:

$H_1(e^{j\Omega}) = 1 - e^{-j\Omega} = 1 - e^{-j\Omega/2} e^{-j\Omega/2} = 2j e^{-j\Omega/2} \underline{(e^{j\Omega/2} - e^{-j\Omega/2})}_{2j}$

$H_1(e^{j\Omega}) = 2 e^{-j\Omega/2} j \; \text{sen}(\Omega/2) = 2 e^{-j\Omega/2} e^{\pi/2} \text{sen}(\Omega/2)$

$\boxed{|H_1(e^{j\Omega})| = 2\,\text{sen}(\Omega/2)}$

$\boxed{\phi(H) = \pi/2 - \Omega/2}$

$H_2(e^{j\Omega}) = 1 - e^{-2j\Omega} = 1 - e^{-j\Omega} e^{-j\Omega} = e^{-j\Omega} \frac{(e^{j\Omega} - e^{-j\Omega})}{2j} \cdot 2j$

$H_2(e^{j\Omega}) = e^{-j\Omega} \text{sen}(\Omega)$

$\boxed{|H(e^{j\Omega})| = \text{sen}(\Omega)}$

$\boxed{\phi(H) = -\Omega}$