

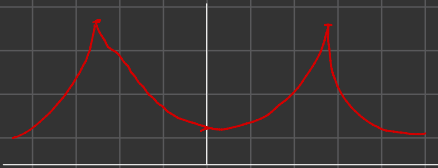
① a)
$$\frac{(z-0)^2}{(z+0.9j)(z+0.9j)} = H(z)$$

0 à n $n/2 = 5$ $n = 1$

$z=1 \rightarrow w=0$
 $z=0 \rightarrow w=\infty$
 $z=\text{pole} \rightarrow w=fc$

à 0
$$\frac{(1-0)^2}{(1+0.9j)(1-0.9j)} = \frac{1}{1+0.9j-0.9j+0.81} = \frac{1}{1.81} = 0.55$$

à fc
$$\frac{(j)^2}{(j+0.9j)(j-0.9j)} = \frac{-1}{-0.19} = 5.26$$



b)
$$\frac{(z-0)^2(z-j)(z+j)}{(z-0.9e^{j\pi/4})(z-0.9e^{-j\pi/4})(z-0.9e^{j3\pi/4})(z-0.9e^{-j3\pi/4})}$$

$z = \text{poles}$ $w = fc$ $z = e^{j\omega}$
 $z=0$ $w=0$ $z = e^{j\pi/4}$
 $z=1$ $w=0$ $z = e^{j3\pi/4}$

$2000\pi \text{ rad/s} \quad \pi/4$

$$\frac{1}{1 - 1.2728z^{-1} + 0.81z^{-2}} \cdot \frac{z^2}{z^2}$$

$$\frac{z^2}{z^2 - 1.2728z + 0.81}$$

$$\frac{e^{j\pi/2}}{e^{j\pi/2} - 1.2728e^{j\pi/2} + 0.81}$$

$$\frac{j}{j - 1.2728j(\cos(\pi/4) - j\sin(\pi/4)) + 0.81}$$

$$\frac{-1}{-1 - 1.2728j(0.707 - 0.707j) + 0.81j}$$

$$\frac{-1}{-1 - 0.8998j + 0.8998 + 0.81j} = \frac{-1}{-0.1 - 0.0898j} = \frac{1}{0.1 + 0.0898j} = \frac{1}{(0.1)^2 + (0.0898)^2} \cdot (0.1 - 0.0898j) = 7.43$$