

Concept Question 6-7: What effects do the locations of the poles and zeros of a system's transfer function $\mathbf{H}(s)$ have on the system's frequency response?

Zeros at $-a \pm j\omega_0$ make the system's frequency response function magnitude $|\mathbf{H}(j\omega)|$ dip to near zero at $\omega \pm \omega_0$ and to zero if $a = 0$.

Poles at $-a \pm j\omega_0$ make the system's frequency response function magnitude $|\mathbf{H}(j\omega)|$ large at $\omega \pm \omega_0$ and blow up if $a = 0$ (a pole on the imaginary axis makes the system unstable).