Frequency Response
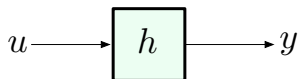

$$u(t) = A\cos(\omega t) \quad \longrightarrow \quad y(t) = A \underbrace{M(\omega)}_{\substack{\text{amplitude} \\ \text{magnification}}} \cos\left(\omega t + \underbrace{\varphi(\omega)}_{\substack{\text{phase} \\ \text{shift}}}\right)$$

Still an incomplete picture:

▶ What about response to general signals (not necessarily sinusoids)? — always given by $Y(s) = H(s)U(s)$

▶ What about response under *nonzero I.C.'s*?— we will see that, if *the system is stable*, then

$$\text{total response} = \underset{\text{(depends on I.C.)}}{\text{transient response}} + \underset{\text{(independent of I.C.)}}{\text{steady-state response}}$$

— need more on Laplace transforms