

$$Y(s) = \left[\frac{1}{s+2} - \frac{1}{s+5} \right] - \frac{2}{s+5}$$

$$Y(s) = \frac{1}{s+2} - \frac{3}{s+5}$$

$$y(t) = e^{-2t} u(t) - 3 e^{-5t} u(t)$$

System Transfer function

$$y(t) = x(t) * h(t)$$

$$Y(s) = X(s) * H(s)$$

$$H(s) = \frac{Y(s)}{X(s)}$$

→ system transfer function.

Frequency Response

substitute $s = j\omega$

in $H(s)$, we

get frequency response $H(j\omega)$

1. The input, output relation of a system at initial state is given by

$$\frac{d^2}{dt^2} y(t) + 4 \frac{d}{dt} y(t) + 3 y(t) = \frac{d}{dt} x(t) + 2 x(t)$$

Find system transfer function, frequency response and impulse response.

$$s^2 y(s) + 4s y(s) + 3 y(s) = s x(s) + 2 x(s)$$

$$y(s) [s^2 + 4s + 3] = x(s) [s + 2]$$

$$H(s) = \frac{y(s)}{x(s)} = \frac{s+2}{s^2+4s+3}$$

Freq. response

$$H(j\omega) = \frac{y(j\omega)}{x(j\omega)} = \frac{j\omega + 2}{(j\omega)^2 + 4j\omega + 3}$$