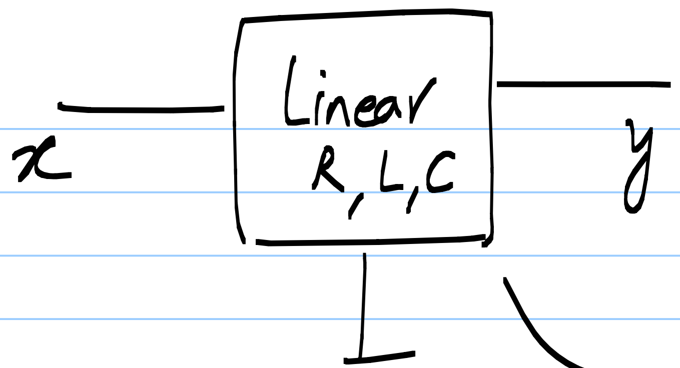


$$\sum_{k=0}^{N} a_k \frac{d^k y}{dt^k} = \sum_{k=0}^{M} b_k \frac{d^k x}{dt^k}$$

$$\sum_{k=0}^{N} a_k \frac{d^k y}{dt^k} = 0$$

$$\sum_k c_k \exp(p_k t)$$

LTI system (R, L, C) : Linear diff. equation w/ constant coefficients

$$\sum_{k=0}^{N} a_k \frac{d^k y}{dt^k} = \sum_{k=0}^{M} b_k \frac{d^k x}{dt^k}$$

Stable amplifiers go to zero

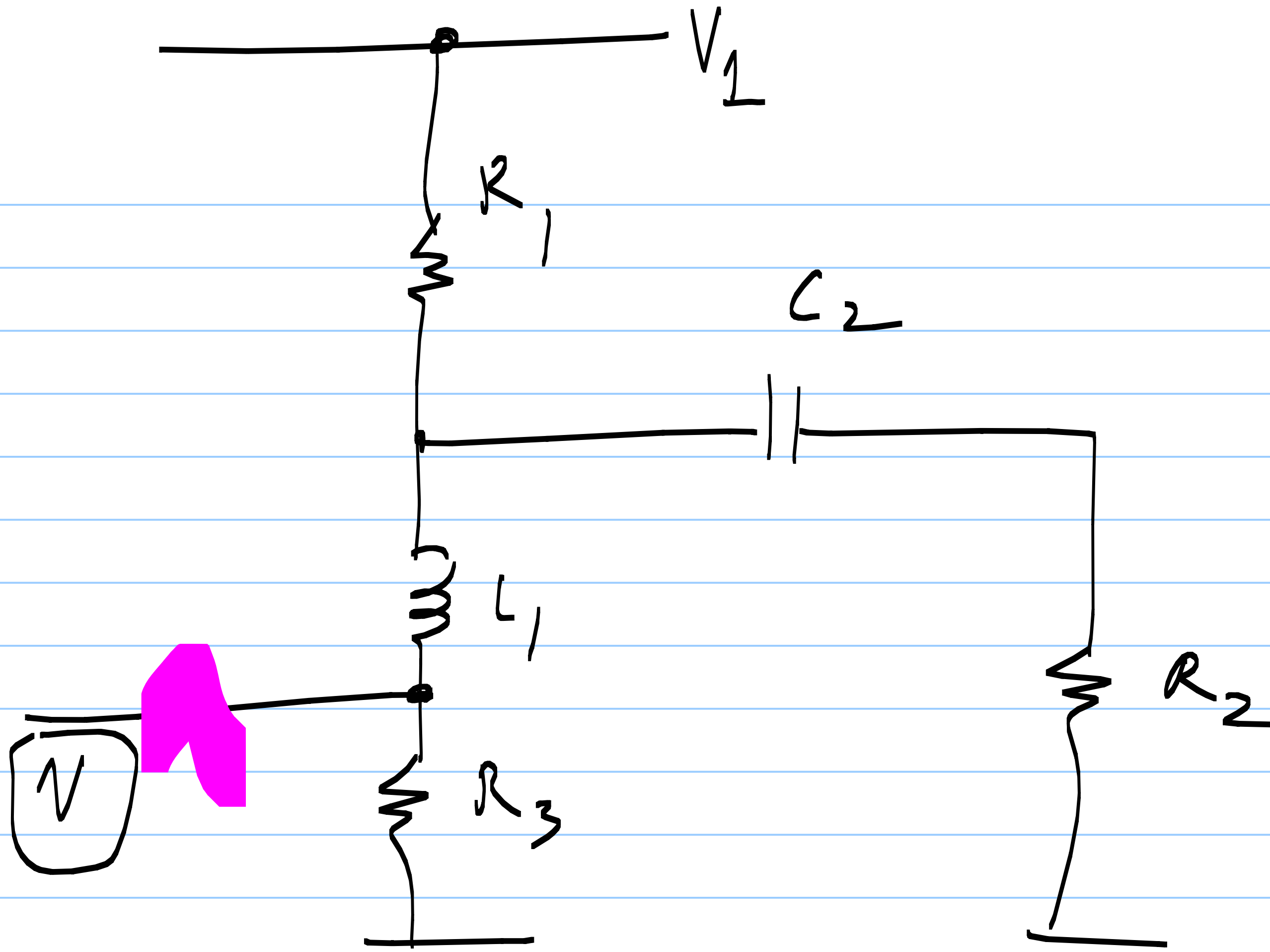
$$y(t) = \left\{\begin{array}{l}\text{steady state} \\ \text{particular solution} \\ \text{Forced response}\end{array}\right\} + \left\{\begin{array}{l}\text{transient} \\ \text{homogeneous solution} \\ \text{Natural response}\end{array}\right\}$$

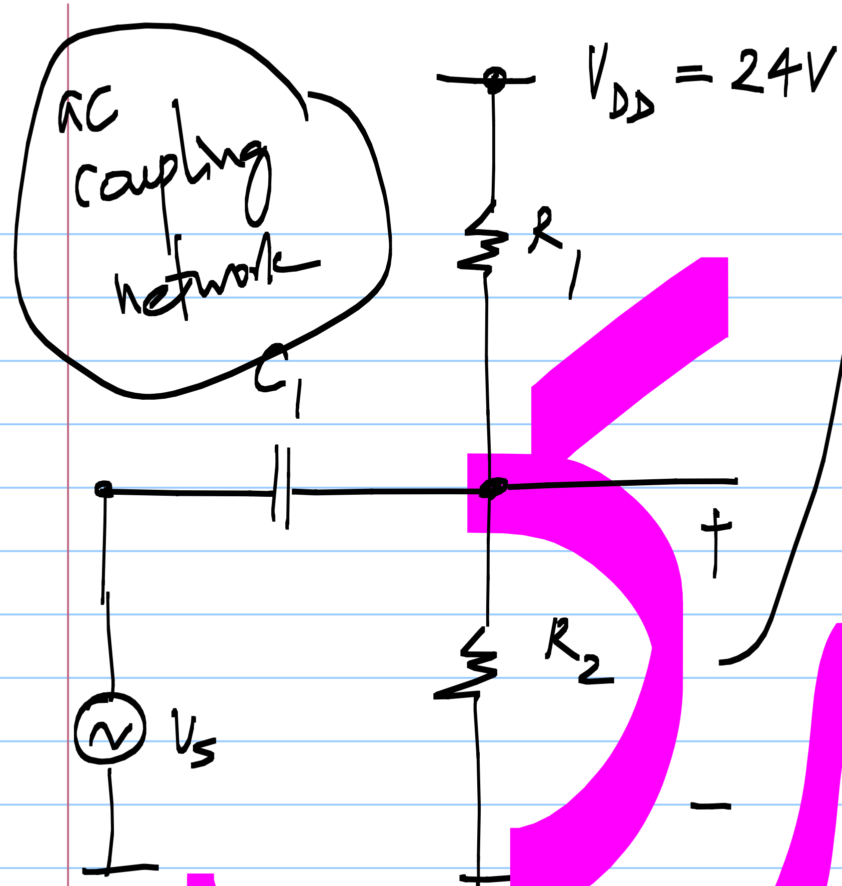
= Zero input response + Zero state response

$y(t) = \left\{ \begin{array}{l} \text{steady state} \\ \text{particular solution} \\ \text{Forced response} \end{array} \right\} + \left\{ \begin{array}{l} \text{transient} \\ \text{homogeneous solution} \\ \text{Natural response} \end{array} \right\}$

if $x(t) = e^{st}$

$$\text{Forced response} = \underbrace{H(s)}_{\text{Transfer function}} \cdot e^{st} \quad \boxed{s = j\omega}$$


V1
R1
C2
L1
V
R3
R2



$$V_{DD} \cdot \frac{R_2}{R_1 + R_2} + V_s(s) \cdot \frac{sC_1(R_1 \| R_2)}{1 + sC_1(R_1 \| R_2)}$$

$s = j\omega$

$$\left[\frac{j\omega C_1 (R_1 \| R_2)}{1 + j\omega C_1 (R_1 \| R_2)} \right]$$

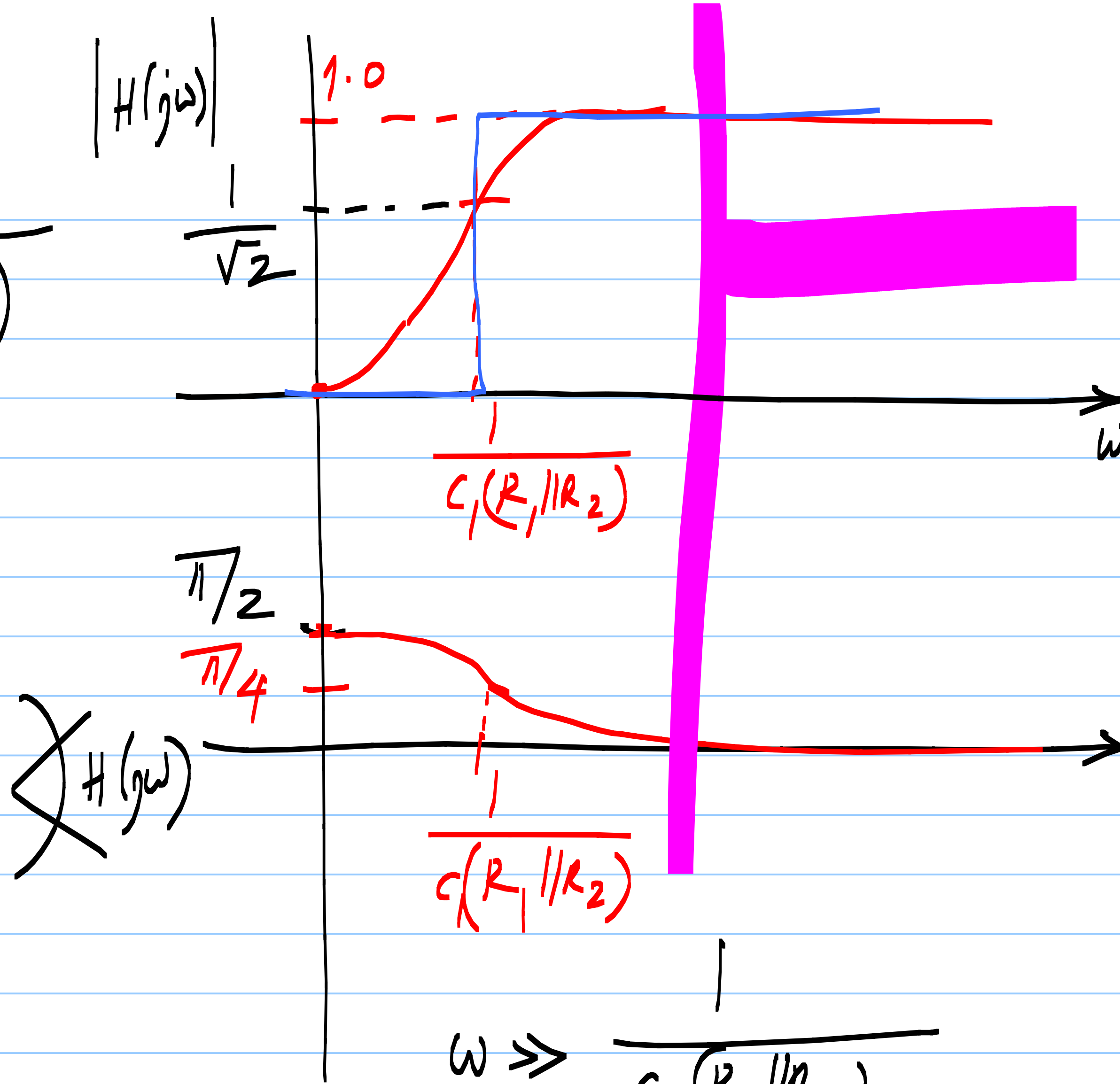
$$10 \log_{10}\left(\frac{P_1}{P_2}\right) = 3.01$$

$$\frac{V_1}{V_2} = \sqrt{2} \qquad 20 \log_{10}\left(\frac{V_1}{V_2}\right) = 3.01$$

$$H(j\omega) = \frac{j\omega C_1 (R_1 \| R_2)}{1 + j\omega C_1 (R_1 \| R_2)}$$

$$\frac{j1}{1+j1}$$

$$\frac{V_{GS}(j\omega)}{V_s(j\omega)}$$



$$\omega \gg \frac{1}{C_1 (R_1 \| R_2)}$$