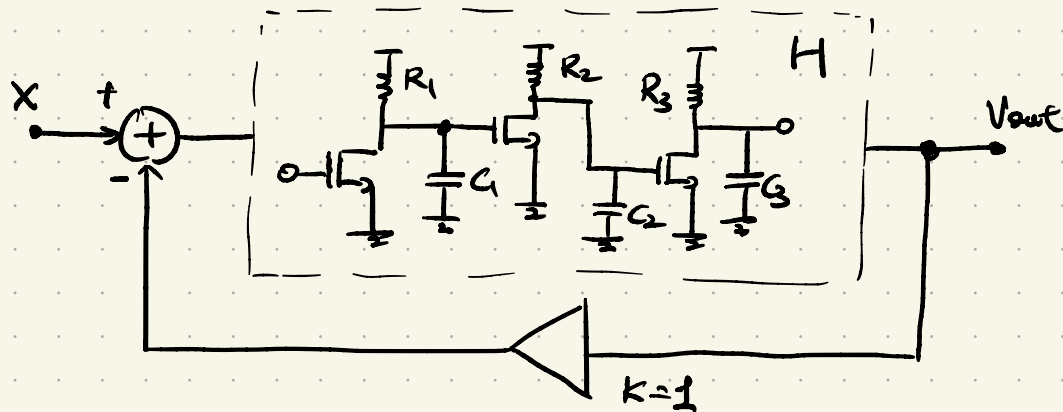


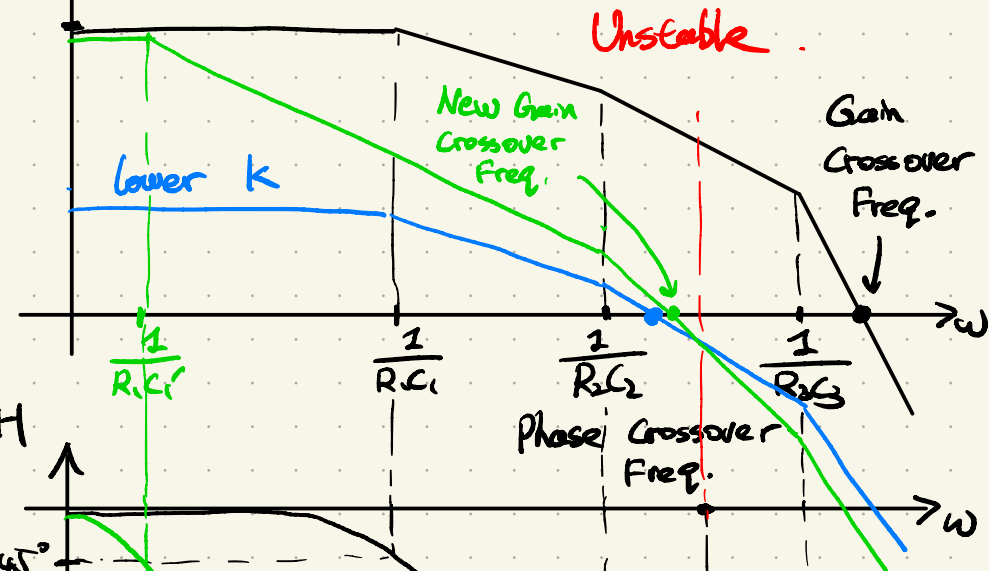
# Lec 4J

- Circuit Examples for Stability Analysis
- Phase Margin
- Frequency Compensation

## Example



$20\log|KH|$



$\angle KH$



What happens if  $K$  is reduced?

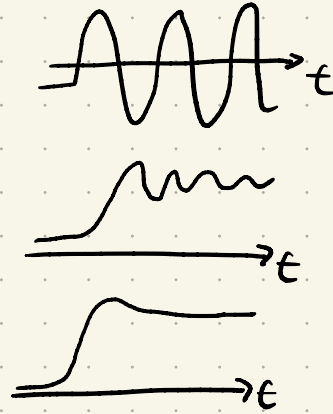
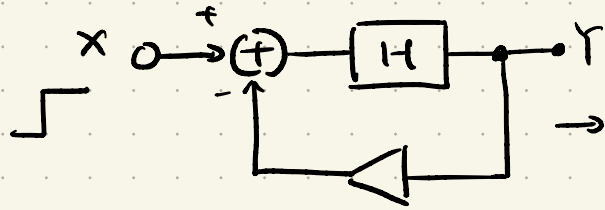
$\Rightarrow$  More stable

What happens if  $C_1$  is increased?

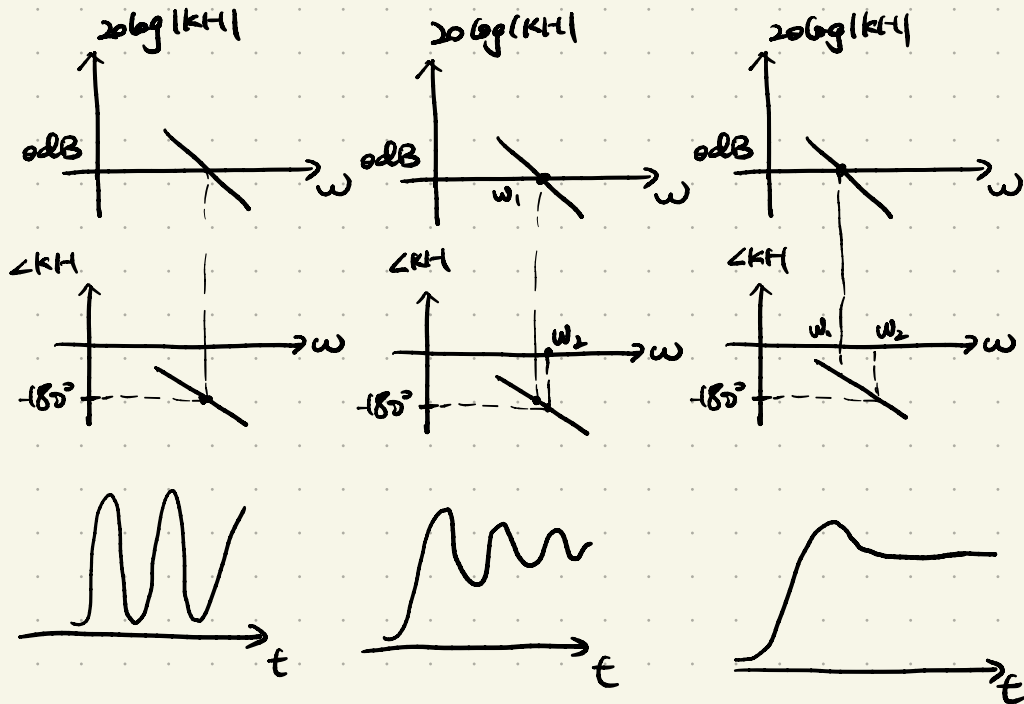
$\Rightarrow$  More stable

# Phase Margin

Note on Stability Test:



Consider these scenarios:

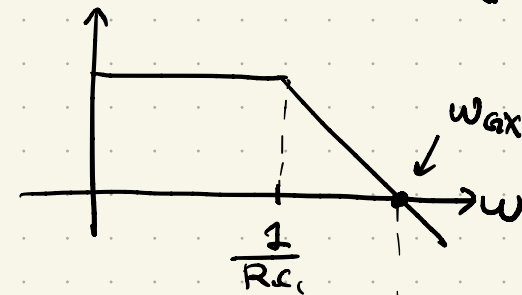
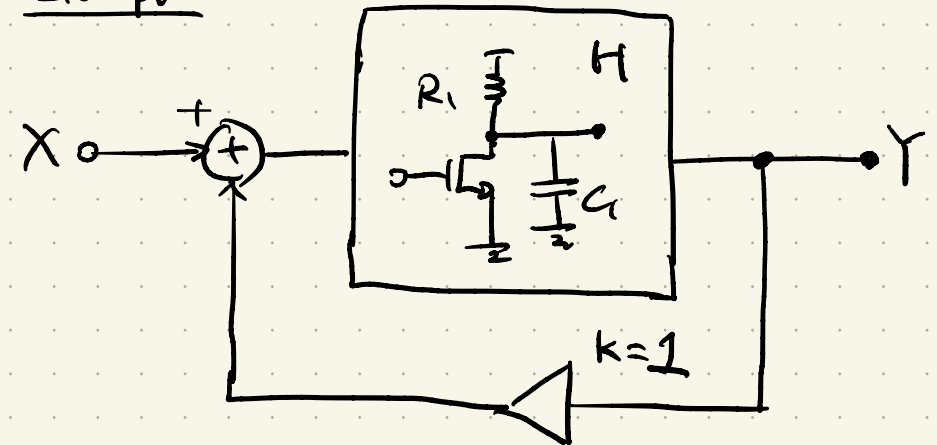


$$\text{Phase Margin} = \angle KH(\omega_{gx}) + 90^\circ$$

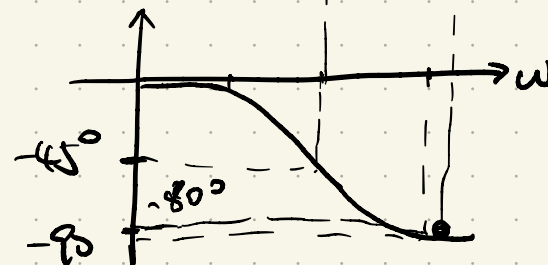
$PM = 60^\circ$  for well-behaved response

$$\Rightarrow \angle KH(\omega_{gx}) \approx -120^\circ$$

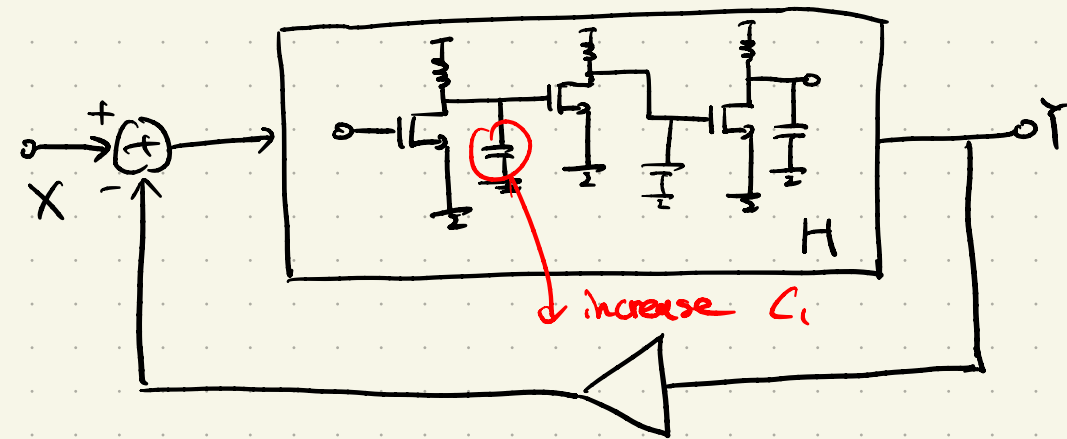
Example



$$PM = -90^\circ + 180^\circ = 90^\circ$$



## Frequency Compensation



freq. compensation by moving the first pole towards the origin.