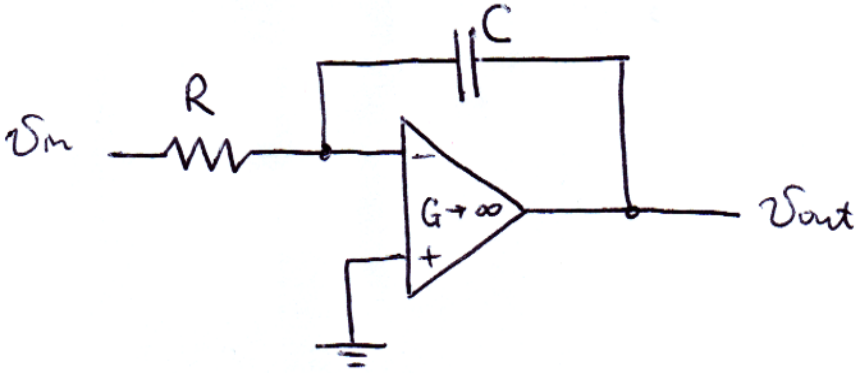
P3360/AEP3630

Lecture 12

Integrator

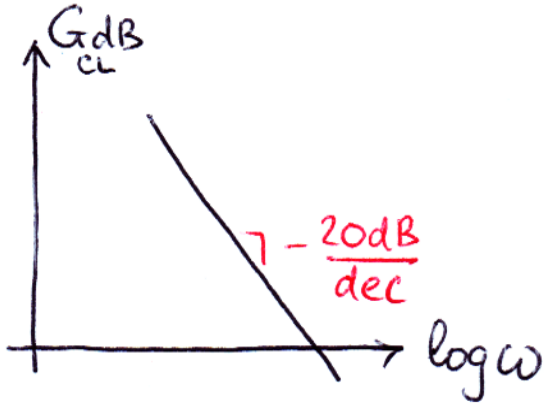
$v_{out} \propto \int v_{in} dt \quad , \Rightarrow \quad G_{CL}(s) \propto$



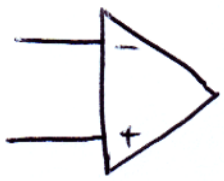
AC response :

$G_{CL}(\omega) =$

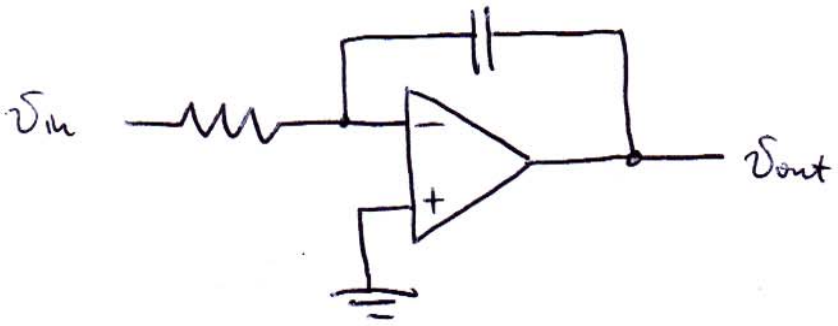
Problem 1 :



Problem 2 :

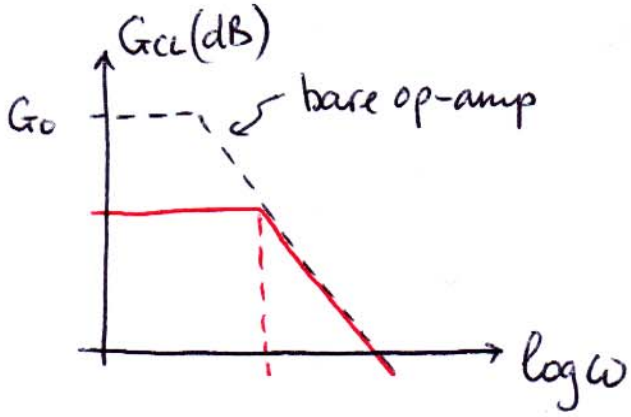


Leaky integrator



$G_{CL}(\omega) \approx$

$G_{CL}(\omega) =$

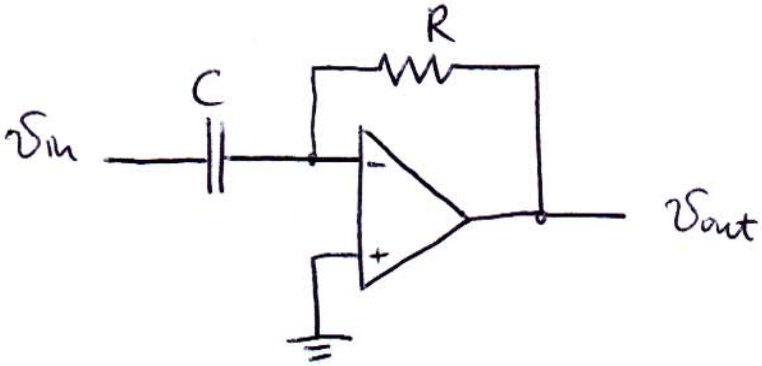


Pros:

Cons:

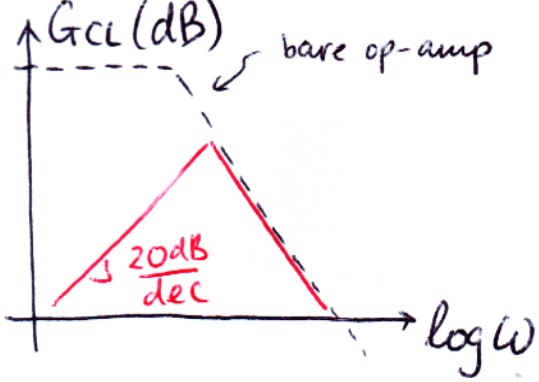
Differentiator

$v_{out} \propto \frac{d}{dt} v_{in}$, $\Rightarrow$ $G_{CL}(s) \propto$



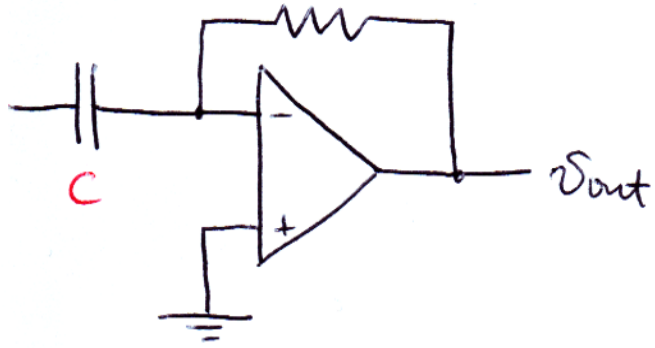
AC response:

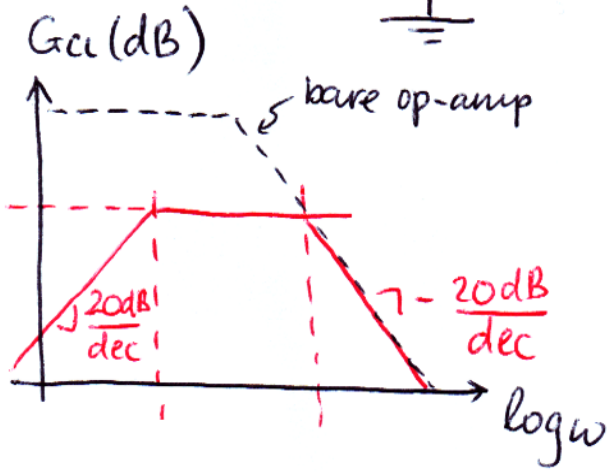
$G_{CL}(\omega) =$



Problem :

Soln :

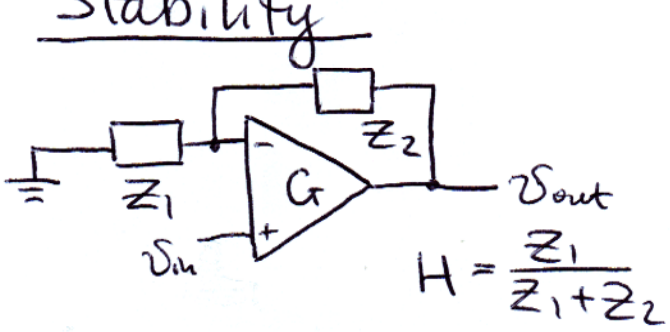




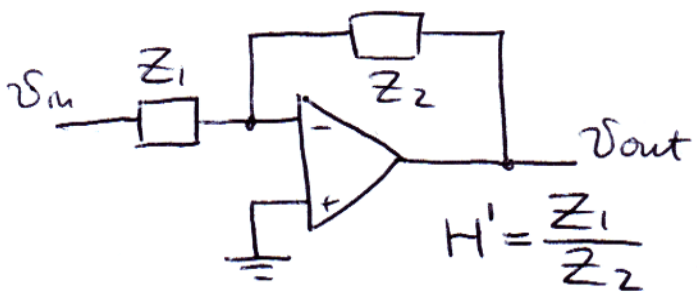
Pros:

Cons:

Stability



$$H = \frac{Z_1}{Z_1 + Z_2}$$

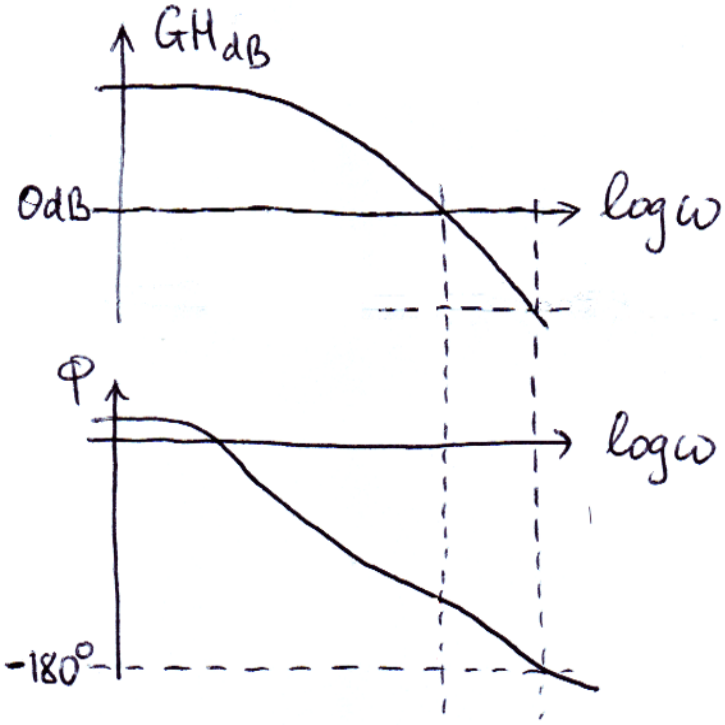


$$H' = \frac{Z_1}{Z_2}$$

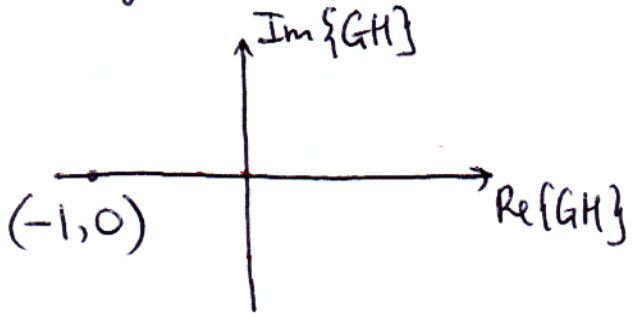
$$G_{CL} = \frac{1}{H} \frac{1}{1+\frac{1}{GH}}$$

$$G_{CL} = -\frac{1}{H'} \frac{1}{\left(1+\frac{1}{G}\right)+\frac{1}{GH'}} \quad (4)$$

Phase & gain margins



Nyquist plots



Nyquist criterion of stability :