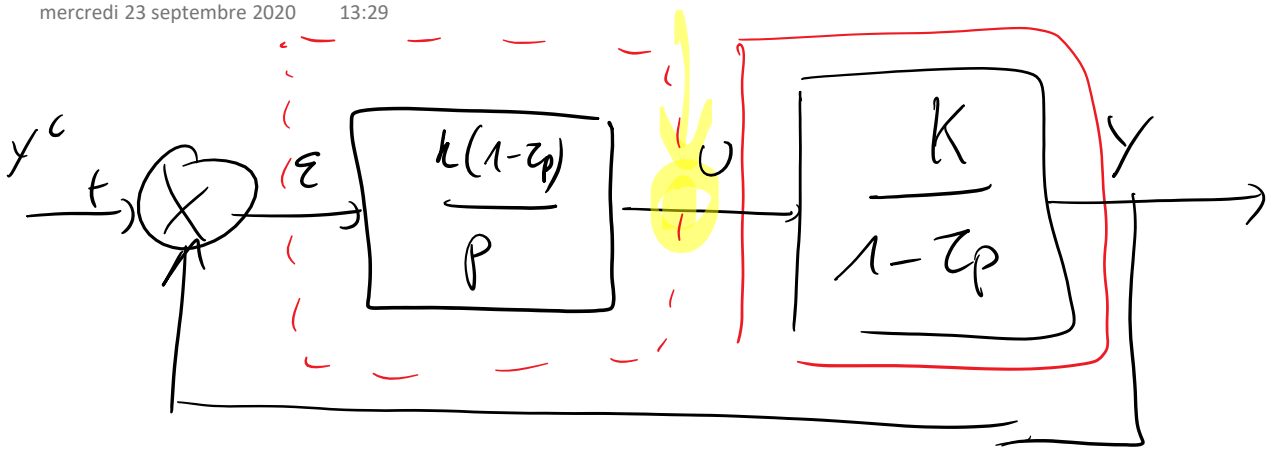
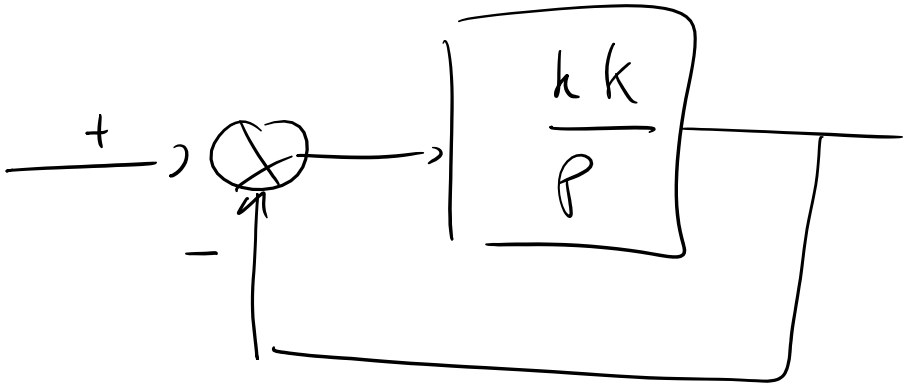
2020.09.23 Cours 7

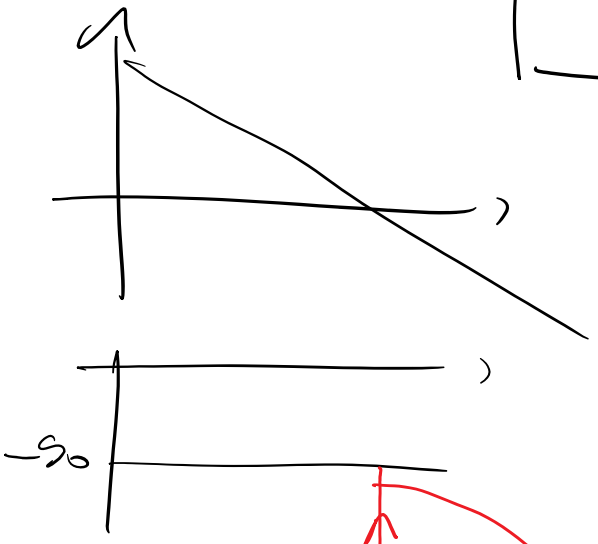
mercredi 23 septembre 2020 13:29



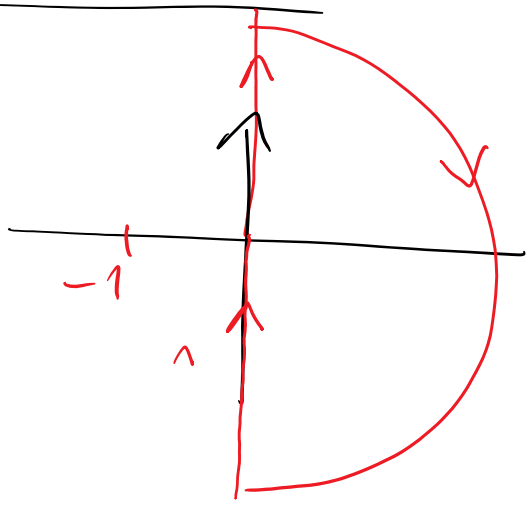
Mathématiquement :



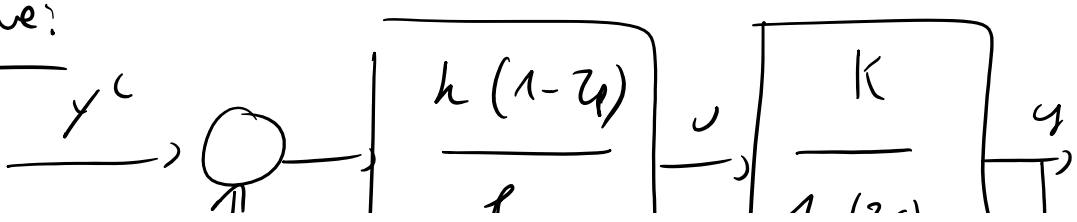
Bode :

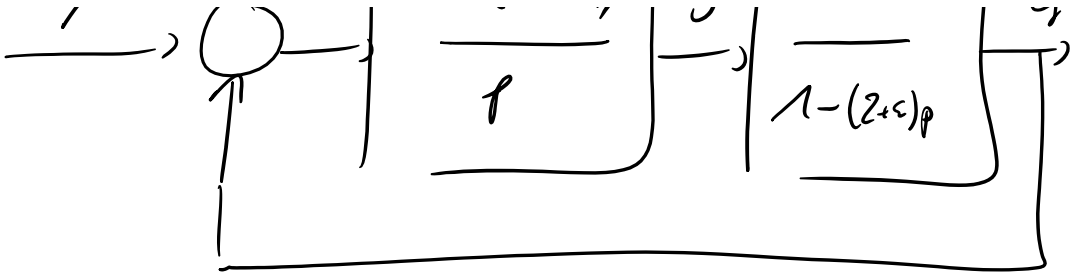


Nyquist :



En pratique :





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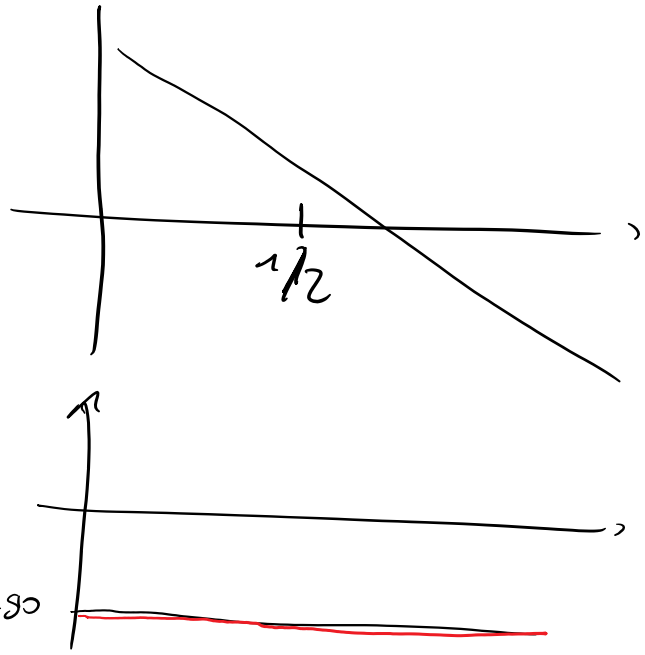
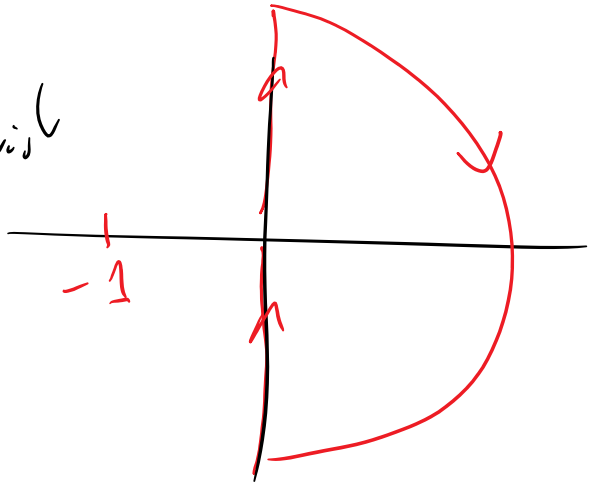
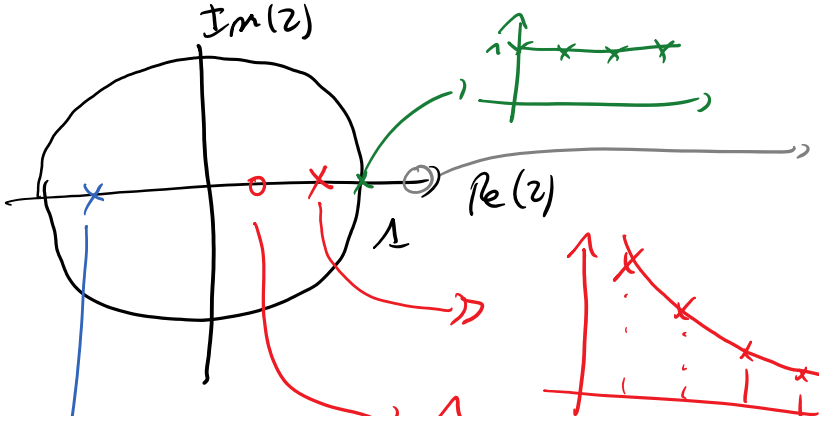
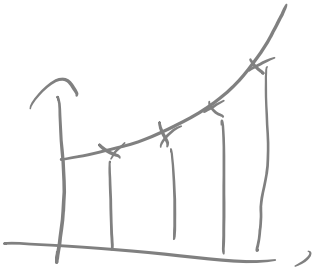


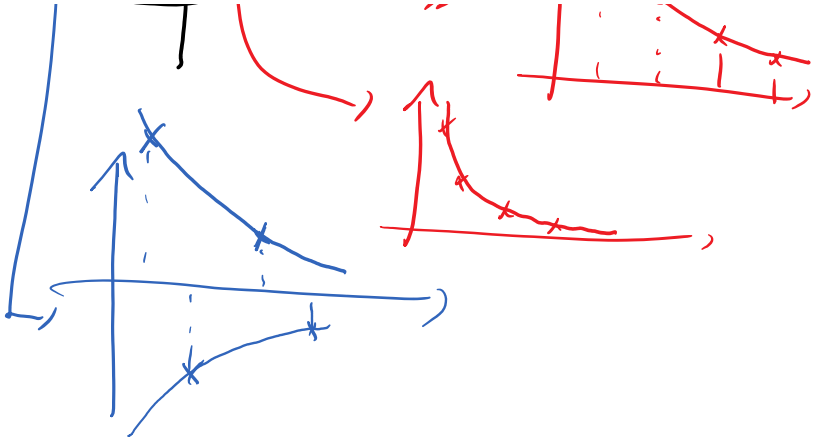
Nyquist



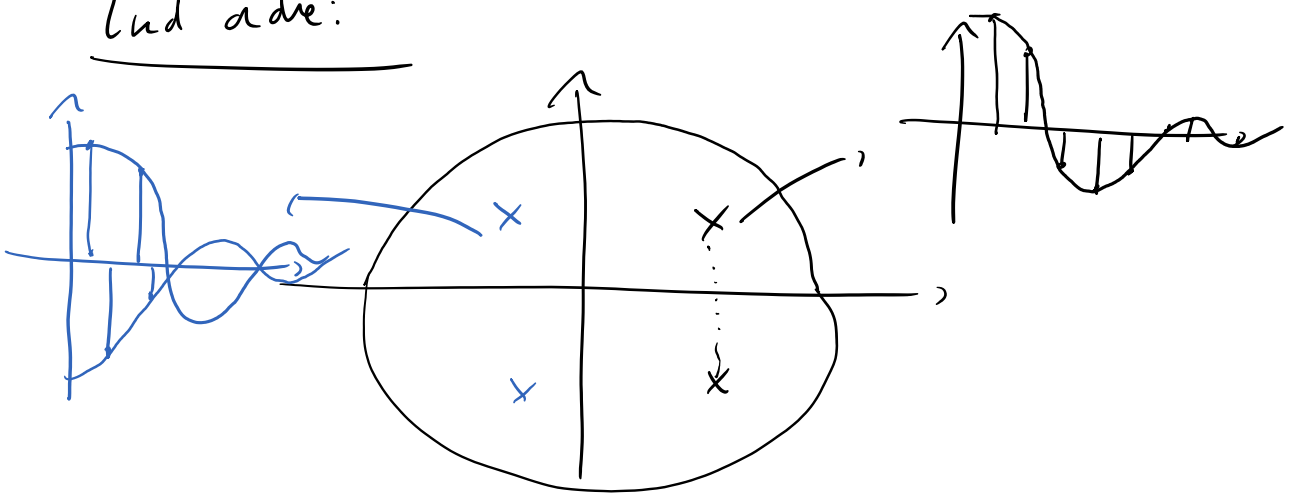
Lien Pole – Comportement.





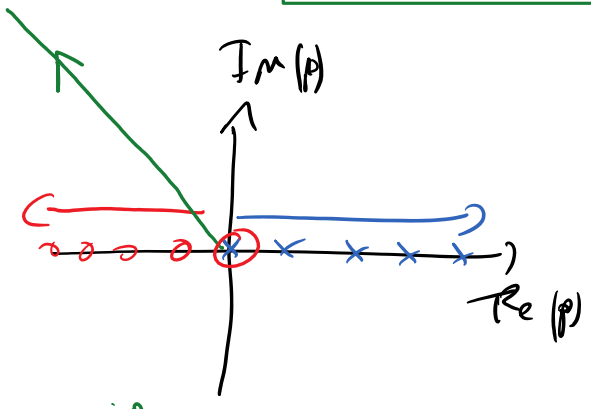


2nd ordre :

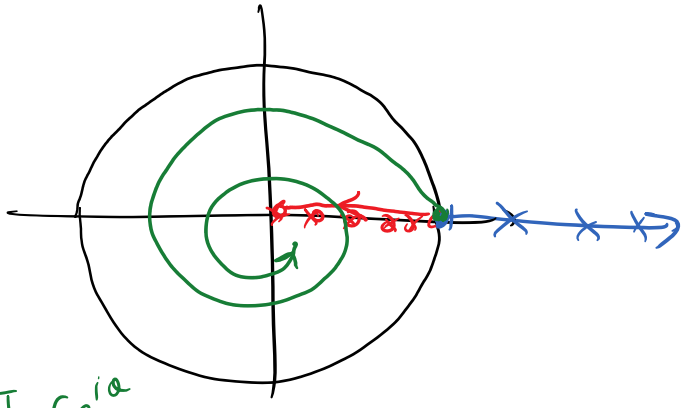


Lien pôles continus et pôles discrets :

$G(p)$	$\xrightarrow{Te}$ "$G(z)$"
p_i	$z_i = e^{Te\, p_i}$



$re^{i\theta}$



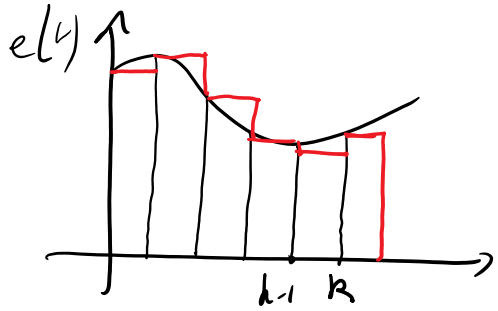
$z_i = e^{Te\, re^{i\theta}} = e^{Te\cos\theta + i\, Te\sin\theta}$

$\pi > \theta > \frac{\pi}{2} \Rightarrow \cos\theta < 0$

$\Rightarrow \sin\theta > 0$

Digitizing.

Euler:



$$S(t) = \int e(t)$$

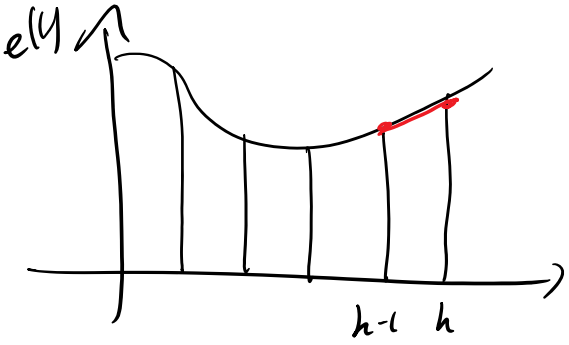
$$\boxed{S(k) = S(k-1) + Te\, e(k)}$$

$$S(k) - S(k-1) = Te\, e(k)$$

$$\boxed{\frac{S}{E} = \frac{Te}{1-z^{-1}}}$$

$$C(p) \Rightarrow \boxed{p \Rightarrow \frac{1-z^{-1}}{Te}}$$

Tustin:



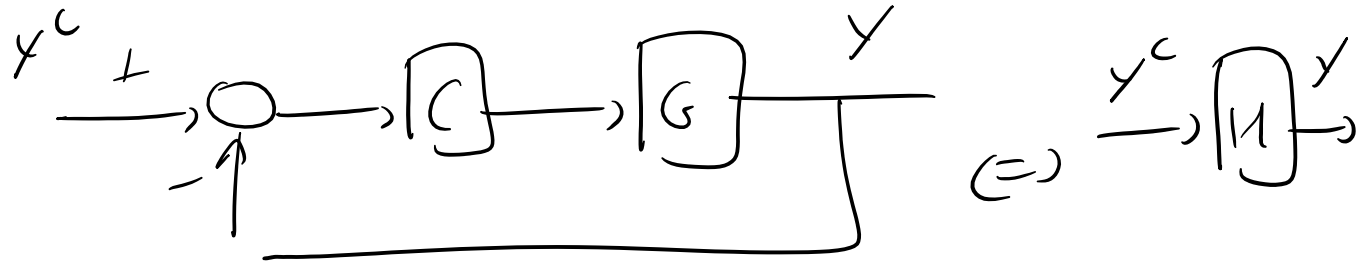
$$S(k) = S(k-1) + \frac{e(k) + e(k-1)}{2} Te$$

$$S(k) - S(k-1) = \frac{Te}{2}\, e(k) + e(k-1)$$

$$\frac{S}{E} = \frac{Te}{2}\,\frac{1+z^{-1}}{1-z^{-1}} = \frac{Te}{2}\,\frac{z+1}{z-1}$$

$$\Rightarrow p \to \frac{2}{Te}\,\frac{1-z^{-1}}{1+z^{-1}}$$

Inversion :



$$\frac{Y}{Y^c} = \frac{CG}{1+CG} = H$$

$$CG = H + CGH$$

$$CG(1-H) = H \Rightarrow \boxed{C = \frac{1}{G}\,\frac{H}{1-H}}$$