

TD3

Question 1

① Plabrd on a

$$\beta = \frac{1}{1 - \frac{s}{\omega R C} - j \left(\frac{6}{\omega R C} - \frac{1}{\omega R C} \right)}$$

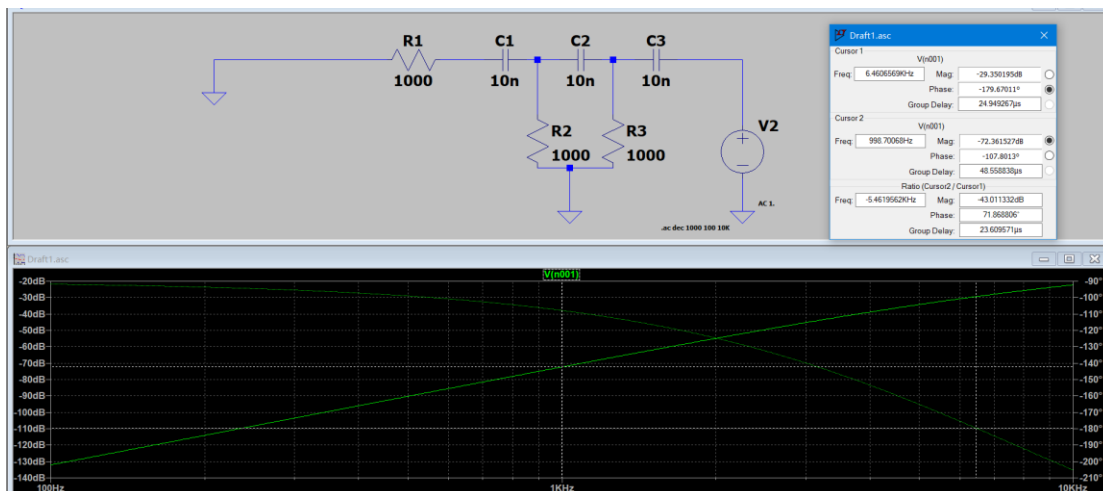
on a

$$\beta(j\omega) = \frac{1}{1 - \frac{s}{(\omega \times 10^9)^2} - j \left(\frac{6}{\omega \times 10^9 \times 10} - \frac{1}{(\omega \times 10^9) \times 10} \right)}$$

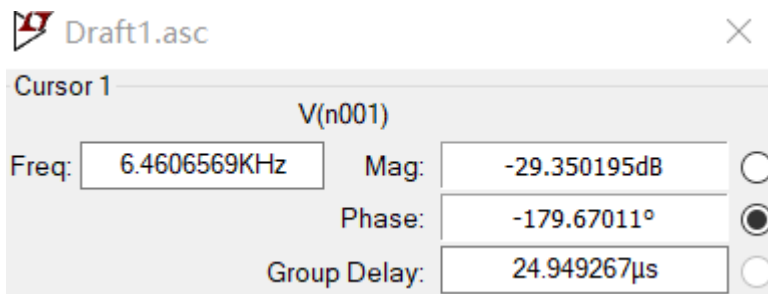
$$|\beta(j\omega)| = \frac{1}{1 - \frac{5}{\omega^2 \times 10^9} - j \left(\frac{6}{\omega \times 10^4} - \frac{1}{\omega^3 \times 10^{14}} \right)}$$

Question 2

1.



Question 2.



$$\varphi = -\arctan \frac{6(\omega CR)^2 - 1}{\omega CR^3 - 5\omega CR} = -\pi$$

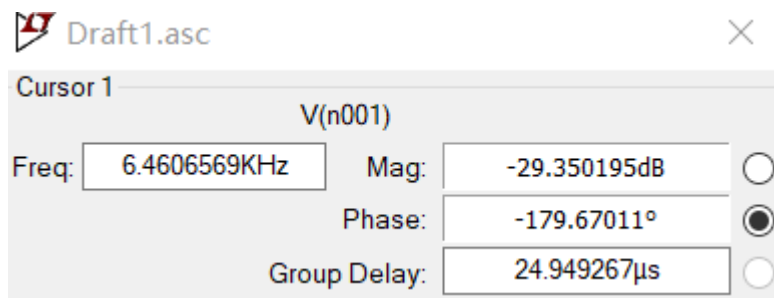
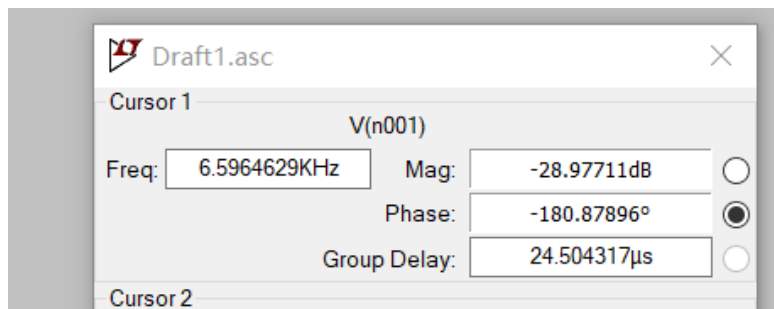
$$\omega = \frac{1}{\sqrt{6} CR} \quad f_0 = \frac{\omega}{2\pi} \approx 6700 \text{ Hz} \quad A = \frac{1}{\sqrt{6}} = 29$$

done on a

$$A = -29,135$$

$$f_0 \approx 64606 \text{ kHz}$$

Question 3.



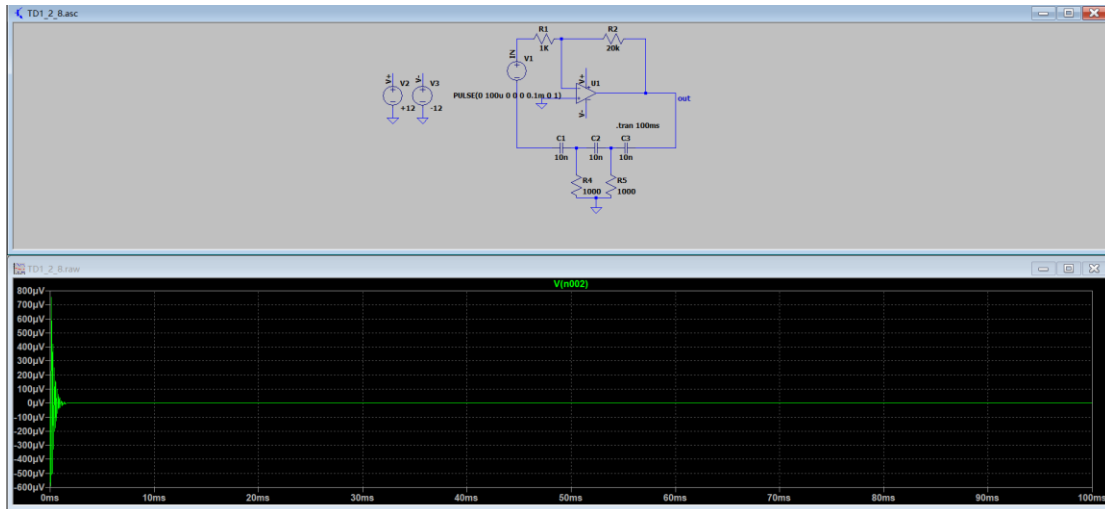
$$d\varphi = - \frac{1}{\left(\frac{6\omega CR^2 - 1}{\omega CR^3 - 5\omega CR} \right)^2 + 1} \times \frac{12\omega CR (6\omega CR^2 - 5\omega CR - 3(6\omega CR^2 - 1)(6\omega CR^2 - 1))}{(6\omega CR^3 - 5\omega CR)^2} \times CR d\omega$$

$$\Rightarrow \left. \frac{d\varphi}{d\omega} \right|_{\omega=\omega_0} = \frac{12\sqrt{6}}{29} \approx 1.01$$

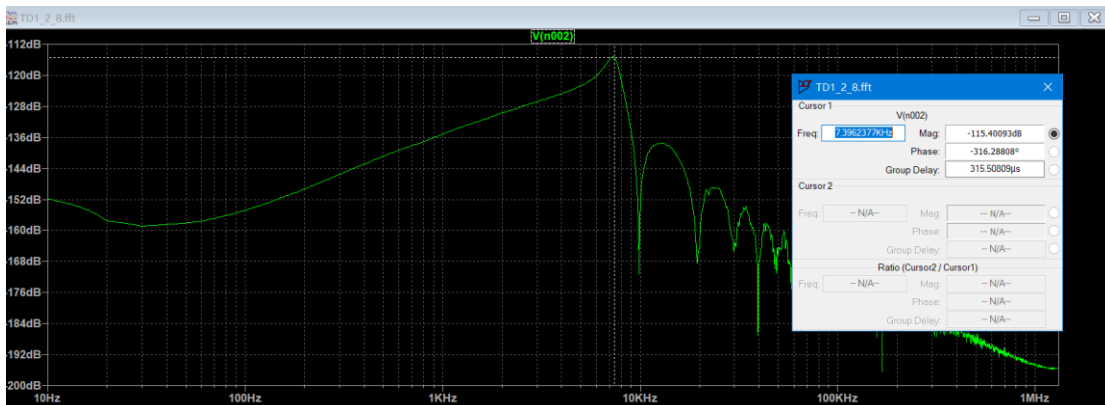
donc d'après le schéma.

$$\left| \frac{d\varphi}{d\omega} \right|_{\omega=\omega_0} = \left| \frac{\omega}{2\pi} \frac{d\varphi}{df} \right|_{\omega=\omega_0} = \frac{\omega_0}{2\pi} \left| \frac{180.87896 + 179.67011}{6.5964 + 6.4606} \right| \times \frac{\pi}{180} \approx 1.0$$

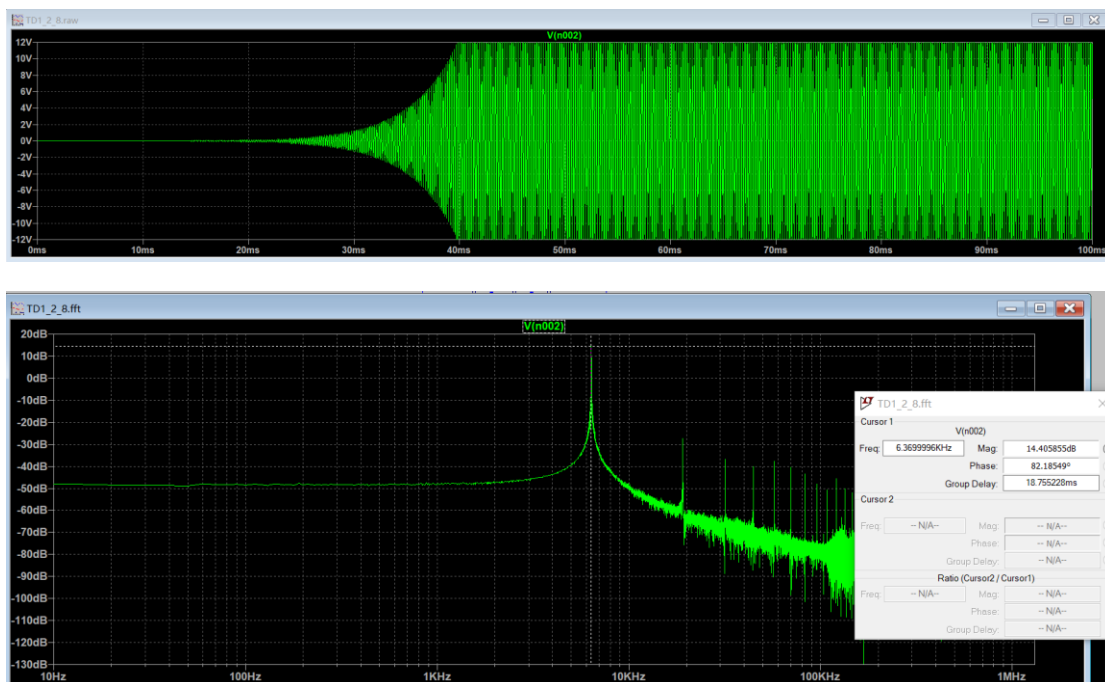
Question 4.et 5



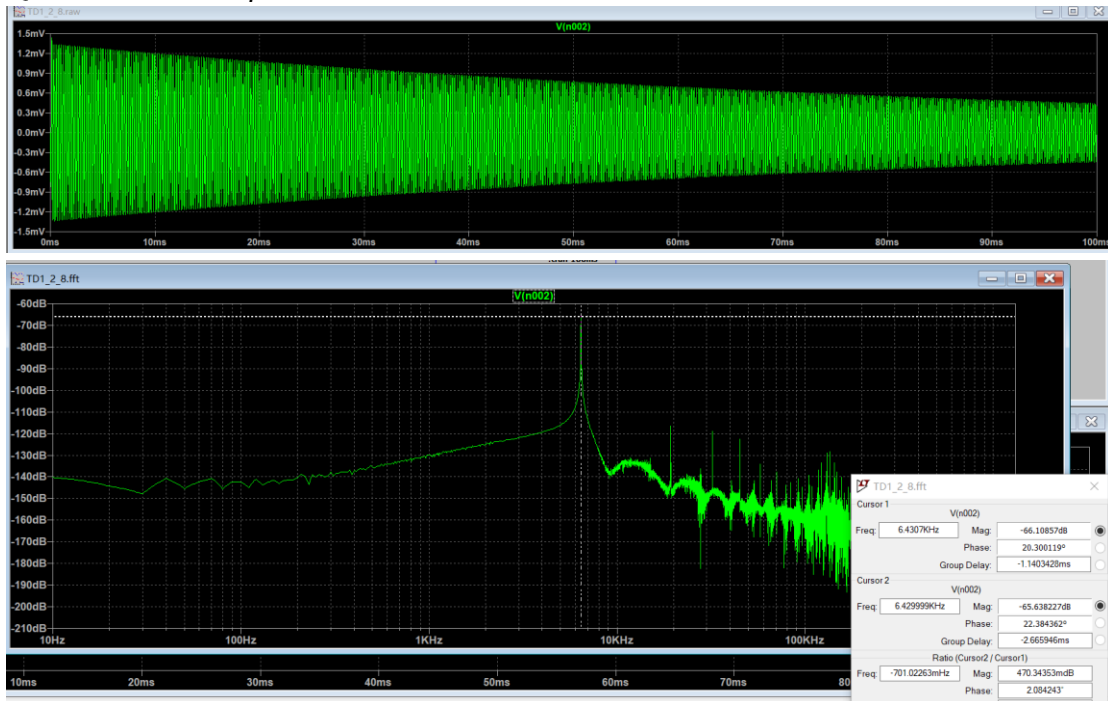
Quand $R=20\text{k}$, on a $A\beta < 1$



Quand $R=30\text{k}$ $A\beta > 1$

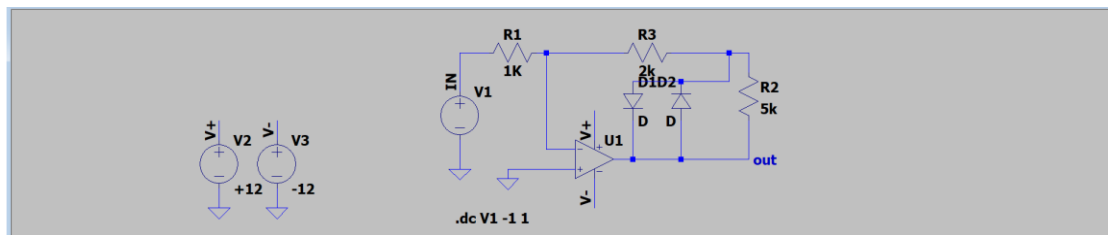


Quand $R=29100$ $A\beta \approx 1$

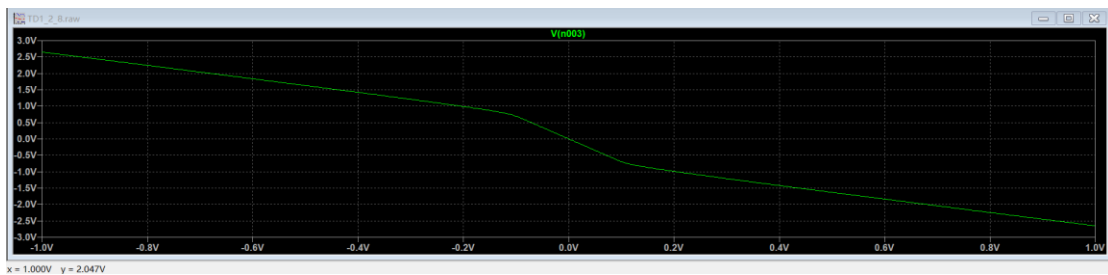


Donc à ce moment la ,on a $f \approx 6.43 \approx 6.5$ khz

Question 6



Question 7



Donc d'après le schéma ,il n'est pas linéaire