Solution #1:

$$\boxed{v_p = A\sin(t+\theta)}$$

$$v_n(t) = Ae^{-2t}$$

$$A\cos(t+\theta) + 2A\sin(t+\theta) = \cos(t)$$

$$+\,2A\cos(t+\theta-90^\circ) = \cos(t)$$

$$A\angle\theta + 2A\angle(\theta-90^\circ) = 1$$

$$A\angle\theta\left(1+(-2j)\right) = 1$$

$$A\angle\theta = \frac{1}{1-2j} = 0.447\angle 63.435^\circ$$

$$v_p(t) = 0.447\sin(t+63.435^\circ)$$

$$v(t) = Ae^{-2t} + 0.447\sin(t+63.435^\circ)$$

$$v(0) = 0 = A + 0.447\sin(63.435^\circ)$$

$$\Rightarrow A = -0.447\sin(63.435^\circ)$$

$$= -0.39981$$

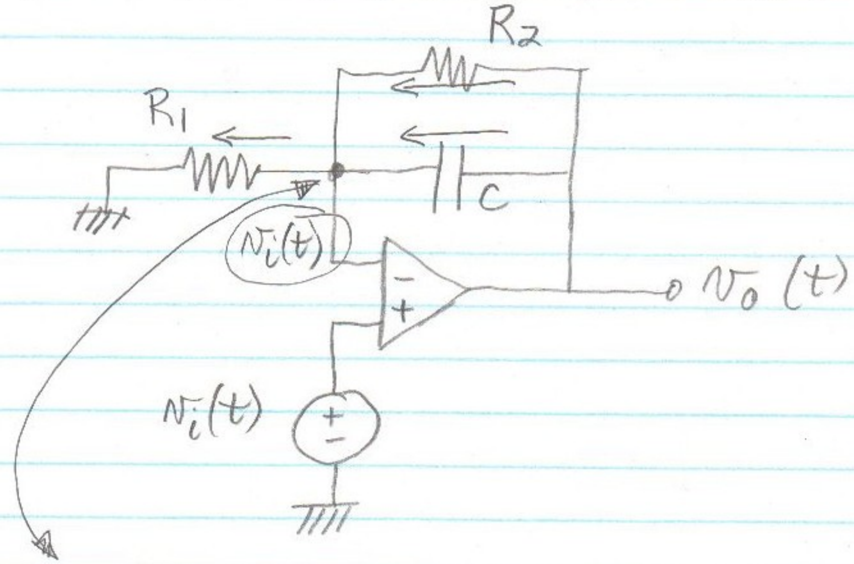
$$\Rightarrow v(t) = 0.447\sin(t+63.435^\circ) - 0.39981e^{-2t}$$

Solution#2:

Voir notes de cours.

Solution #3:

(a) Avec le court-circuit virtuel on a :



LCK donne :

$$\frac{v_0(t)-v_i(t)}{R_2} + C\,\frac{d(v_0(t)-v_i(t))}{dt} = \frac{v_i}{R_1}$$

qui est réécrit comme :

$$v_0'(t) + \frac{v_0(t)}{R_2 C} = v_i'(t) + \frac{v_i(t)}{(R_1 \| R_2)C}$$

En remplaçant

$$R_1 = R_2 = 5\Omega$$
$$C = 0.15F$$

on obtient

$$v_0'(t) + 4/3\ v_0(t) = v_i'(t) + 8/3\ v_i(t)$$