$i_s(t) = 10 \angle 0°$

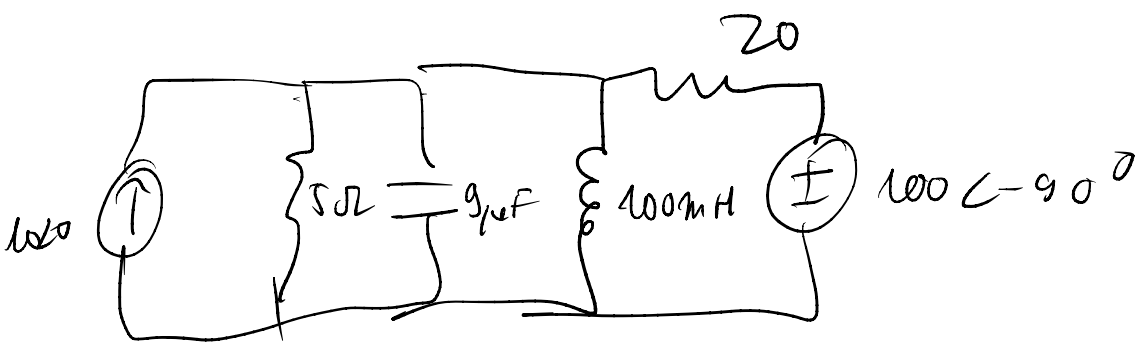
$v_s(t) = 100 \angle -90°$

$\omega = 50000$ rad/s

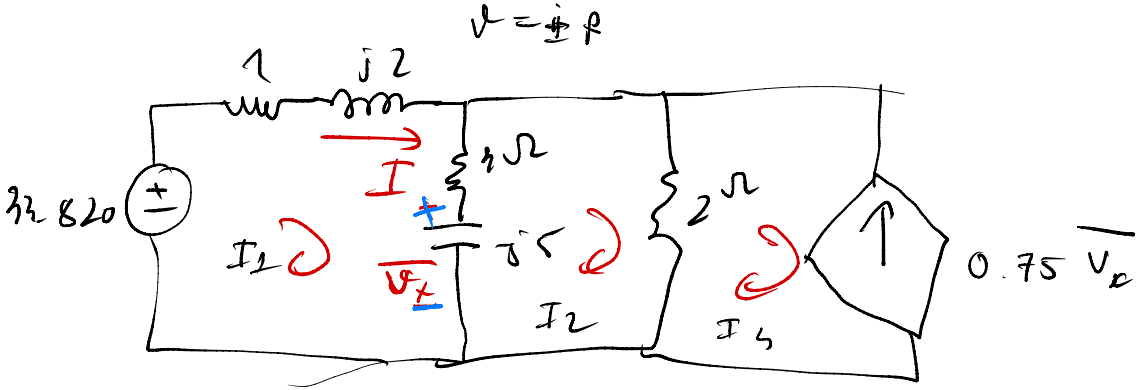
$$\bar{Z}_C = \frac{-j20}{9}$$

$\bar{V} = 71.62 \angle -71.57°$

$v(t) = 71.62 \cos(50000t - 71.57°)$ V.



$\omega = 50000$ rad/s



$I_4 = 0.75\,\overline{V_x}$, $\overline{V_x} = (-j5)(I_1 - I_2)$

$= -(0.75(-j5)(I_1 - I_2))$

loop 1 : $-33.8\angle 0 + I_1(1 + j2) + (3 - j5)(I_1 - I_2)$

$= I_1(1 + j2 + 3 - j5) + I_2(j5 - 3) = 33.8\angle 0$

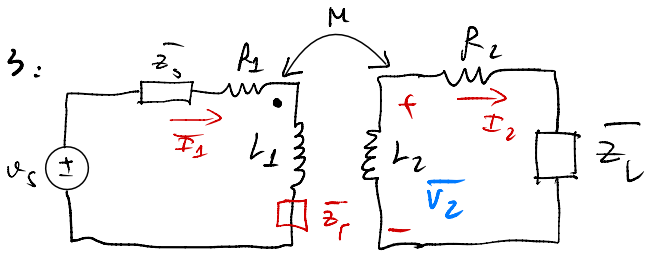
$= I_1(4 - j3) + I_2(j5 - 3) = 33.8\angle 0$

loop 2: $(3 - j5)(I_2 - I_1) + 2(I_2 - V_x) = 0$

$=$

$\overline{I} = I_1 = 29.07 \angle 3.95^\circ$

Question 3:



$\bar{Z}_L = 360\ \Omega$ in series with $0.25\ H$

$\bar{Z}_s = 18\ k\Omega$, $v_g = 245.2\cos(800t)$ (V)

$R_1 = 100\ \Omega$, $L_1 = 0.5\ H$, $L_2 = 0.125\ H$

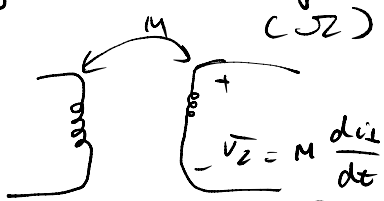
$R_2 = 40\ \Omega$, $k = 0.5$

$M = k\sqrt{L_1 L_2} = 0.1\ H$

$jwM = j\,800 \times 0.1 = j80\ (\Omega)$

a) Find $\bar{Z}_{reflected\ 1}$

b) $\bar{I}_1 = ?$, $I_2 = ?$



$\bar{Z}_L = 360 + j\,800 \times 0.25$

$\bar{Z}_{11} = \bar{Z}_s + R_1 + jwL_1 =$

$\bar{Z}_{22} = R_2 + jwL_2 + \bar{Z}_L = 400 + j\,300\ (\Omega)$

a) $\bar{Z}_r = \frac{(wM)^2}{|\bar{Z}_{22}|^2}\,\bar{Z}_{22}^{*} = 10.24 - j\,7.68\ (\Omega)$

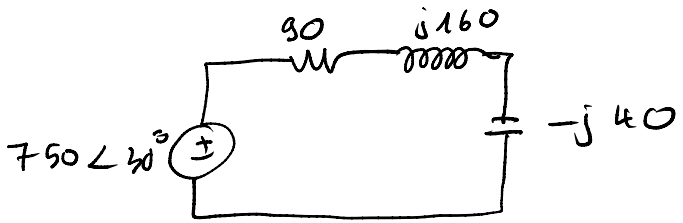
b) $\bar{I}_1 = \frac{\bar{V}_g}{\bar{Z}_{11} + \bar{Z}_r} = \frac{245.2\angle 0}{\bar{Z}_{11} + \bar{Z}_r} = 0.5\angle -53.13^\circ$

$\Rightarrow i_1(t) = 0.5\cos(800t - 53.13^\circ)$ (A)

$I_2 = \frac{\bar{V}_2}{R_2 + \bar{Z}_L} = \frac{jwM\bar{I}_1}{R_2 + \bar{Z}_L} = 0.08\angle 0^\circ$

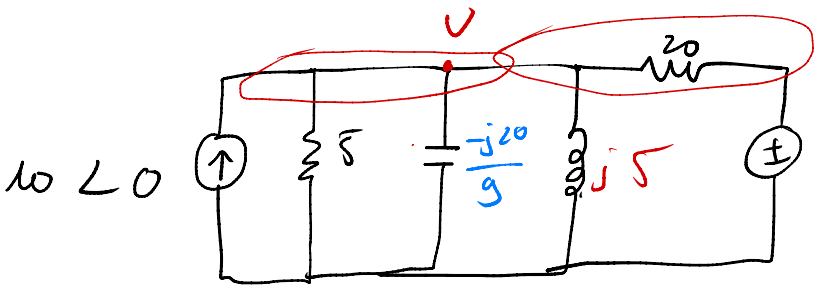
$\Rightarrow i_2(t) = 0.08\cos(800t)$

$v_s = 750\cos(5000t + 30°)\ V$



$Z_{total} = 90 + j120$

$$\rightarrow I_s = \frac{750\angle 30°}{90 + j120} = 5\angle -2.34°$$



$V = 10 - j30$

$i_s(t) = 10\cos \omega t$, $v_s(t) = 100 \sin \omega t$, $\omega = 50k$ rad/s

Node-Voltage: $\frac{\bar{V}}{\frac{-j20}{9}} + \frac{\bar{V}}{5} + \frac{\bar{V}}{j5} + \frac{\bar{V} - 100\angle -90^\circ}{20} = 10$

$\Rightarrow \bar{V}\left(j\frac{9}{20} + \frac{1}{5} - \frac{j}{5} + \frac{1}{20}\right) = 10 - j5$

$\Rightarrow \bar{V}\left(0.25 + j0.25\right) = 10 - j5$

$\Rightarrow \bar{V} = 10 - j30 = 31.62\angle -71.56^\circ$

$100 \times 10^{-6} \times 10^{3} \times 5000$

$Z_L = 100\,mH = 100 \times 10^{-6} \times 50 \times 10^{3} j$

$= j5$???