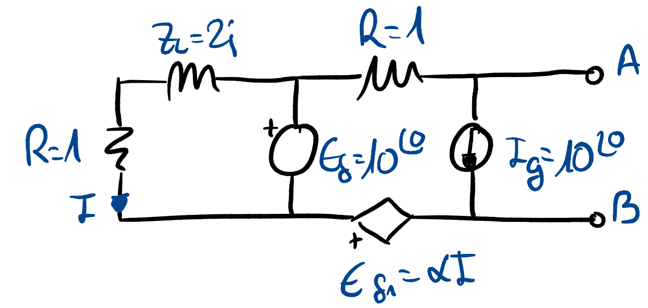
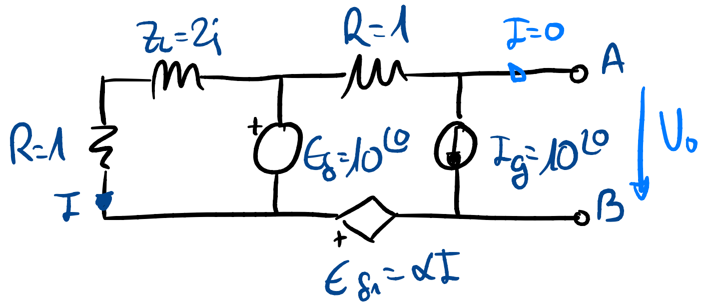
Problema 1



Thevenin
Norton

Tensión circuito abierto

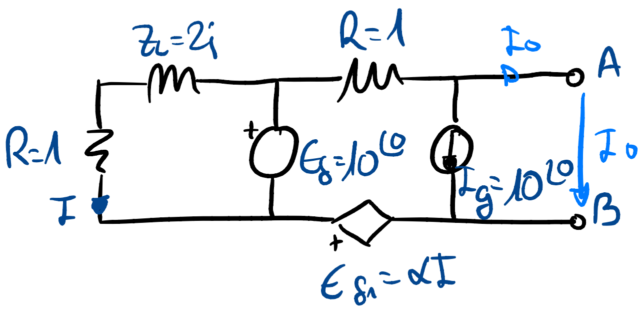


$$E_{g1}+E_g = I_g R + U_0 \rightarrow U_0 = E_{g1}+E_g - I_g R = \alpha I + \cancel{10\angle 0} - \cancel{10\angle 0}\cdot 1 = \alpha I$$

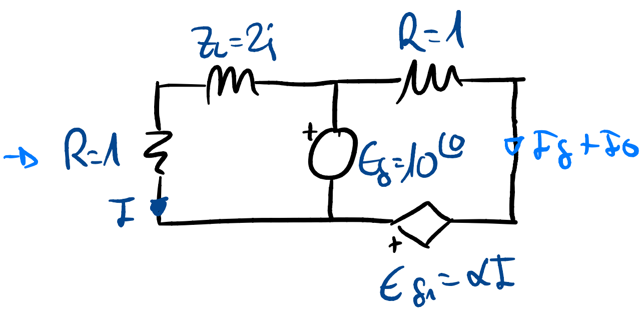
$$E_g = I(R+Z_L) \rightarrow I = \frac{E_g}{R+Z_L} = \frac{10\angle 0}{1+j2} = \frac{10(1-j2)}{1^2+2^2} = \frac{10(1-j2)}{5} = 2(1-j2)$$

$$U_0 = \alpha\cdot 2(1-j2)$$

Corriente cortocircuito



→



$$E_g + E_{g1} = (I_g + I_0)R \rightarrow I_0 = \frac{E_g + E_{g1} - I_g R}{R} = \frac{\cancel{10\angle 0} + \alpha I - \cancel{10\angle 0}\cdot 1}{1} = \alpha I$$

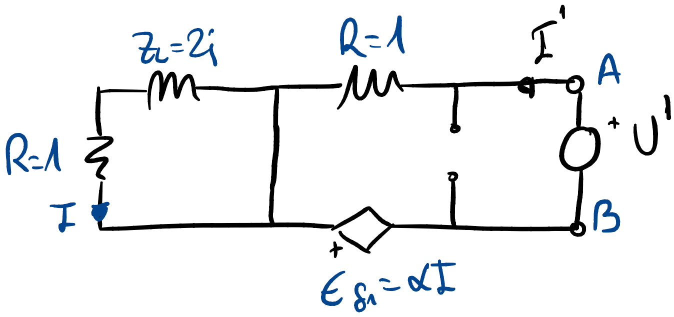
$$E_g = I(Z_L+R) \rightarrow I = \frac{E_g}{Z_L+R} = \frac{10\angle 0}{1+j2} = 2(1-j2)$$

$$I_0 = \alpha\, 2(1-j2)$$

Resistencia equivalente (R_{eq})

circuito pasivo

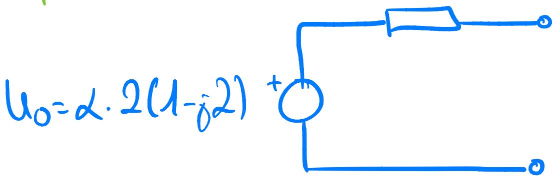
$U_0 = I_0 R_{eq} \rightarrow R_{eq} = \frac{U_0}{I_0} = \frac{\alpha I}{\alpha I} = 1$



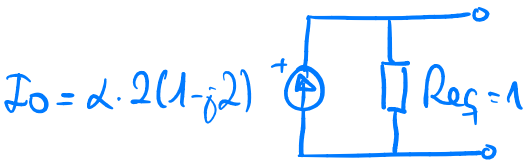
$0 = I(R + Z_L) \rightarrow I = 0 \rightarrow \varepsilon_{g1} = 0$

$R_{eq} = 1$

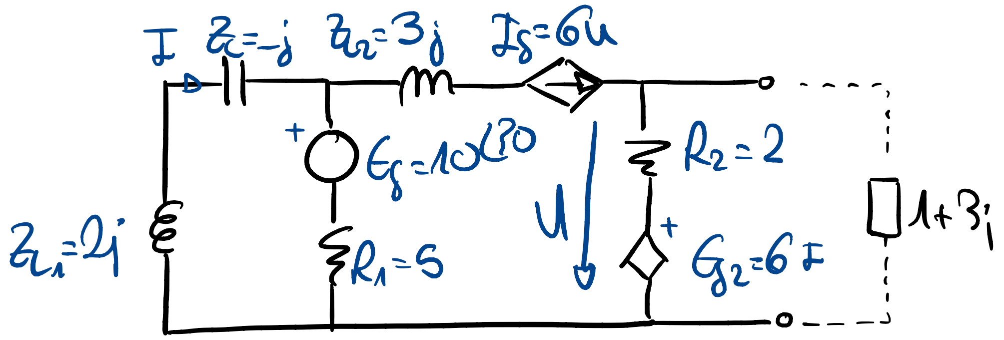
Eq. Thevenin



Eq. Norton

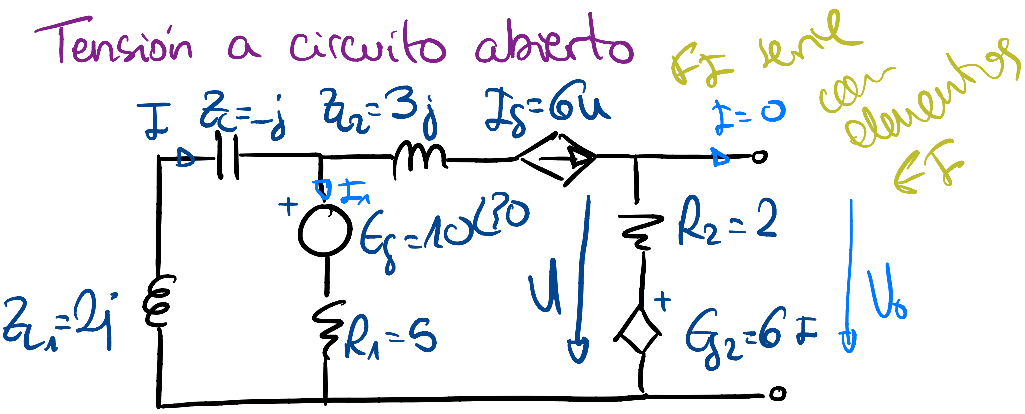


Problema 2



Thevenin
Norton
y impedancia

Tensión a circuito abierto



$I_1 + I_g = I \Rightarrow I_1 = I - I_g$

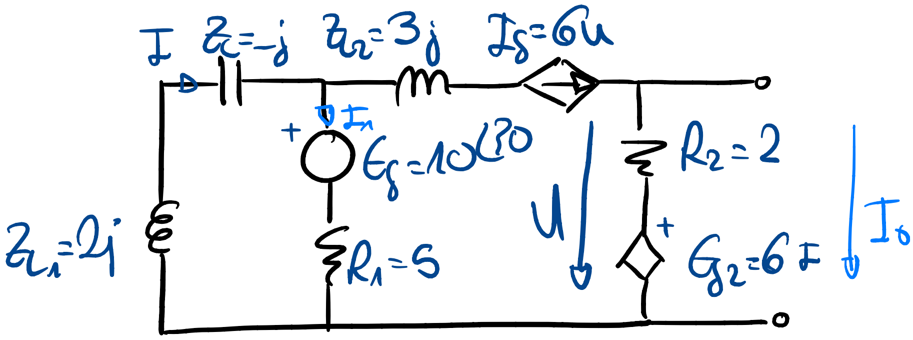
$U_0 = I_g R_2 + G_{g2} = 6U_0 \cdot 2 + 6I = 12U_0 + 6I \Rightarrow I = \frac{-11U_0}{6}$

$-E_g = I(Z_C + Z_{L1} + R_1) - I_g R_1 \Rightarrow -10\angle 30 = \frac{-11U_0}{6}(-j + j2 + 5) - 6U_0 5$

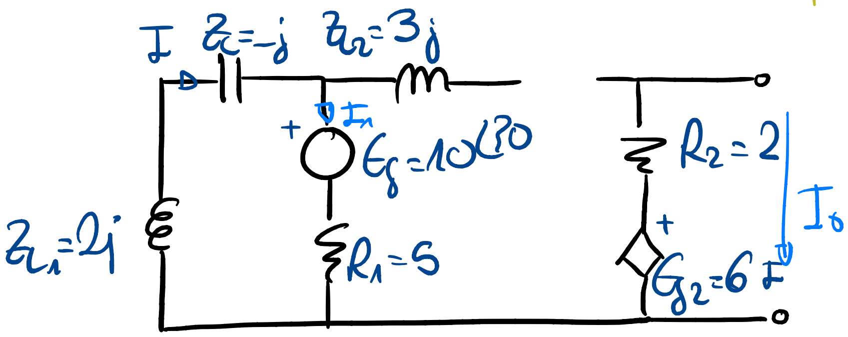
$\Rightarrow -60\angle 30 = -11U_0(5+j) - 180U_0 \Rightarrow -60\angle 30 = (-235 - j11)U_0 \Rightarrow$

$\Rightarrow U_0 = \frac{60\angle 30}{235.257\angle 2.68} = 0.255\angle 27.32°$

Intensidad de cortocircuito I_0



Tenemos $U=0$ (por cortocircuito)



$$E_{g2}=I_0 R_2 \rightarrow I_0=\frac{E_{g2}}{R_2}=\frac{6I}{2}=3I$$

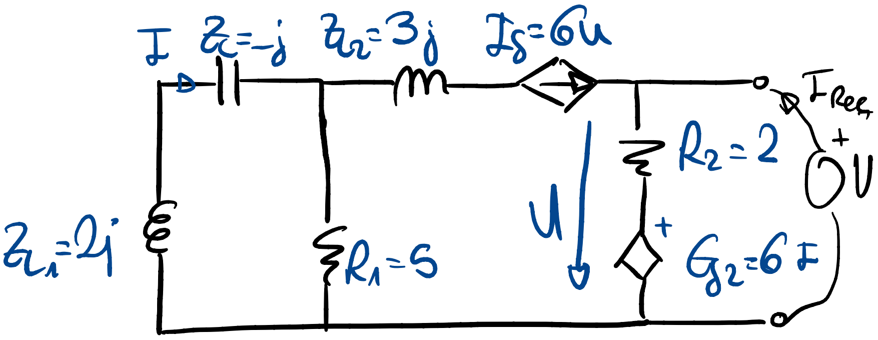
$$-E_g=I(R_1+Z_c+Z_{L1}) \rightarrow -10\angle 30 = I(5-j+j2) \rightarrow I=\frac{-10\angle 30}{5+j}=\frac{-10\angle 30}{5.099\angle 11.3099}$$

$$=-1.9612\angle 18.6901$$

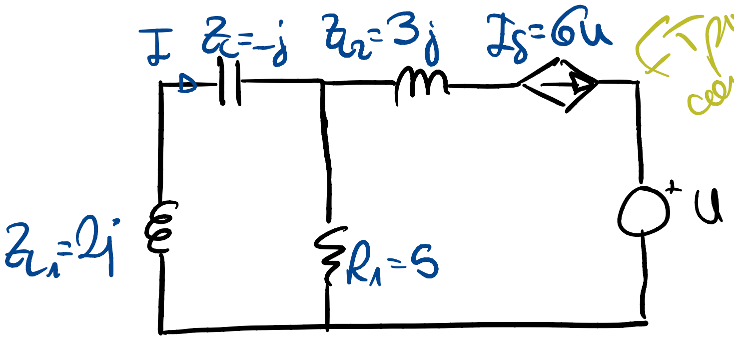
$$I_0=3I=3\cdot(-1.9612\angle 18.6901)=-5.8836\angle 18.6901$$

Impedancia equivalente

$$Z_{eq}=\frac{U_0}{I_0}=\frac{0.255\angle 27.32^\circ}{-5.8836\angle 18.6901}=-0.0433\angle 8.6299^\circ$$

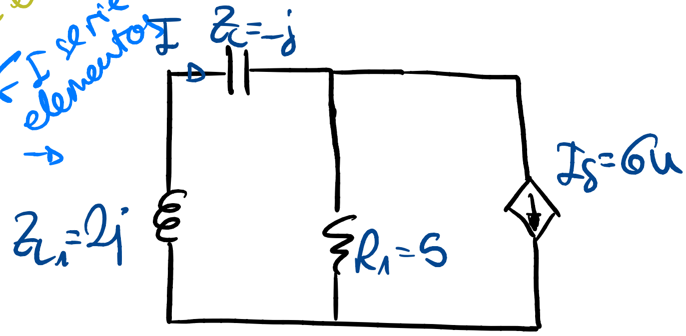


$U - \varepsilon_{g2} = (I_{Req} + I_g) R_2 \rightarrow U - 6I = (I_{Req} + 6U)\,2 \rightarrow I = \frac{11U + 2I_{Req}}{-6}$

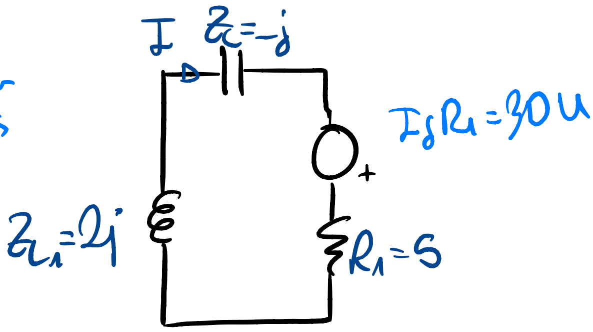


FI paralelo con elementos

FI serie elementos →



FI par con resis →

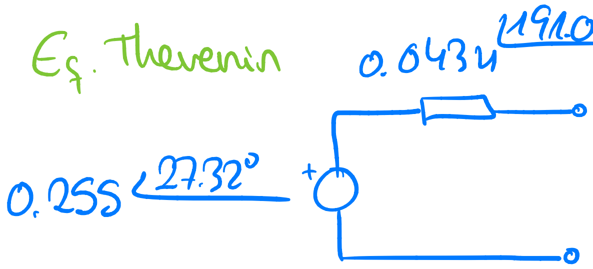


$I_g R_1 = I(Z_C + Z_{L1} + R_1) \rightarrow 30U = \frac{11U + 2I_{Req}}{-6}(-j + j2 + 5) \rightarrow$

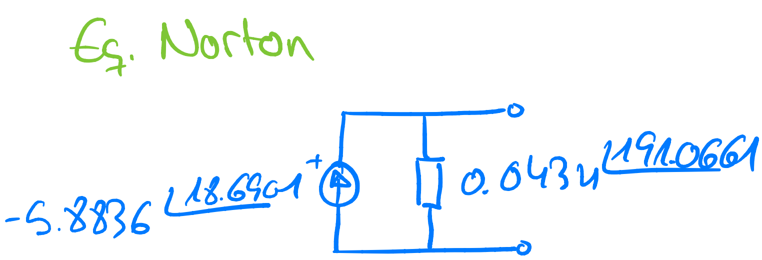
$\rightarrow -180U = (11U + 2I_{Req})(5+j) \rightarrow U(-180 - 55 - j) = 2I_{Req}(5+j)$

$R_{eq} = \frac{U}{I_{Req}} \rightarrow R_{eq} = \frac{2(5+j)}{-235-j} = \frac{10.198\angle 11.3099}{235\angle -179.7562} = 0.0434\angle 191.0661$

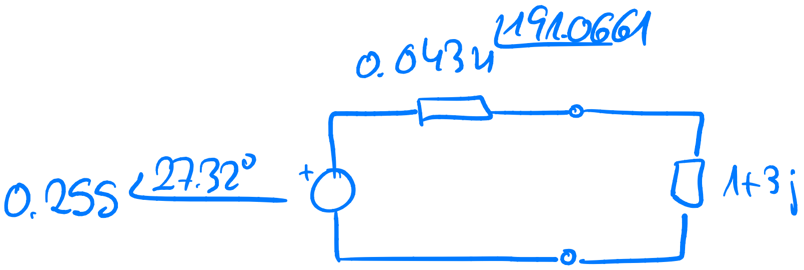
Eq. Thevenin



Eq. Norton



U_Z



$$Z = 0.0434\angle 191.0661 + 1+3j = -0.0426 - j0.0083 + 1 + j3 =$$

$$= 0.9574 + j2.9917 = 3.1412\angle 72.2544$$

$$U_0 = I_Z Z \rightarrow I_Z = \frac{U_0}{Z} = \frac{0.255\angle 27.32}{3.1412\angle 72.2544} = 0.0812\angle -44.9344$$

$$U_Z = I_Z(1+3j) = 0.0812\angle -44.9344 \cdot 3.1623\angle 71.5651 = 0.2568\angle 26.6307$$